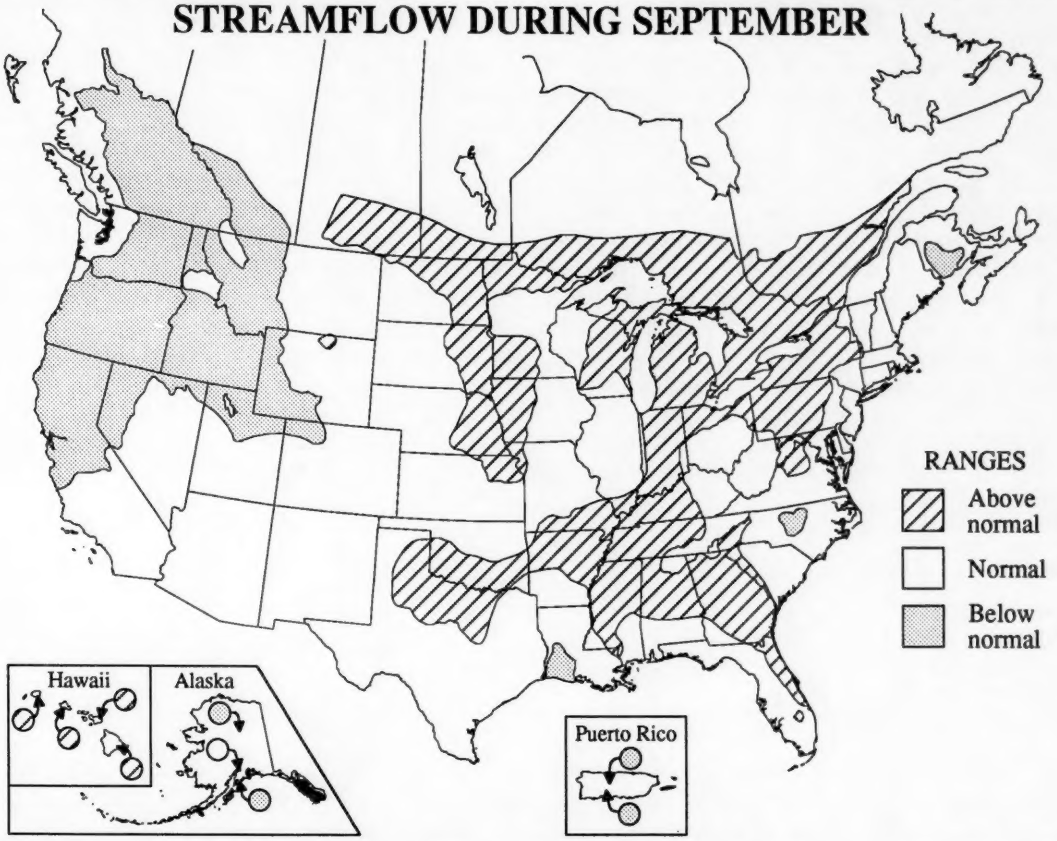
National Water Conditions

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

SEPTEMBER 1992

STREAMFLOW DURING SEPTEMBER



A rainstorm that occurred the last week in August in the Brooks Range of northern **Alaska** caused several streams to flood the first of September, washed out roads, and halted oil production for several days at some oil fields in the area.

During September 10-11, an intense, late-night, localized thunderstorm caused torrential flooding in two tributaries of the Oconaluftee River in **North Carolina's** Great Smoky Mountains National Park, affecting the Cherokee Indian Reservation.

On September 14, intense thunderstorms produced up to 16 inches of rain during a 24-hour period in a narrow band across south-central **Iowa**. The Governor declared six counties disaster areas.

On September 16, up to 8 inches of rain caused widespread flooding in south-central and southwestern **Wisconsin**. Damage estimates are not complete, but an early estimate exceeded $10 million.

September streamflow decreased from that for August at 106 index stations, remained the same at 3 index stations, and increased at 83 index stations, resulting in normal to above-normal range streamflow at 84 percent of the 192 reporting index stations in the United States, southern Canada, and Puerto Rico during the month.

Below-normal range streamflow occurred in 28 percent of the area of the conterminous United States and southern Canada during September, compared with 23 percent during August. Total flow during September for the 174 reporting index stations in the conterminous United States and southern Canada was 37 percent above median and 6 percent more than last month.

The combined flow of the 3 largest rivers in the lower 48 States—Mississippi, St. Lawrence, and Columbia—averaged about 14 percent above median and in the normal range, after a 24 percent decrease in flow from August to September. Flow of the St. Lawrence River was in the above-normal range. Flow of the Mississippi River was in the above-normal range for the second consecutive month. Flow of the Columbia River was in the below-normal range for the fifth consecutive month.

Month-end index reservoir contents were in the below-average range at 33 of 100 reporting sites, compared with 31 of 100 during August, and 29 of 99 at the end of September 1991. Two reservoirs in the West had no usable storage.

Mean September elevations at four master gages on the Great Lakes were in the normal range on all four lakes but below median on Lake Superior and Lake Huron. Levels rose from those for August on Lake Superior and Lake Erie.

Utah's Great Salt Lake level fell 0.40 foot, ending the month at 4,199.90 feet above National Geodetic Vertical Datum. Lake level was 1.60 feet lower than at the end of September 1991.

SURFACE-WATER CONDITIONS DURING SEPTEMBER 1992

A rainstorm during the last week in August in the Brooks Range of northern **Alaska** caused several streams to flood on September 1, washed out roads, and halted oil production for several days at some oil fields in the area. Two culverts at the upper Kuparuk River and the Dalton Highway were washed out and were last seen headed toward the Arctic Ocean.

During September 10-11, an intense, late-night, localized thunderstorm caused torrential flooding in two tributaries of the Oconaluftee River in **North Carolina's** Great Smoky Mountains National Park, affecting the Cherokee Indian Reservation in Swain County. Flooded areas included about 74 square miles at the mouth of Raven Fork and about 18 square miles at the mouth of Straight Fork, a tributary to Raven Fork. About 500 people were evacuated from homes on the Indian Reservation and from many campgrounds along the streams. Although no deaths or injuries were reported, some bridges were washed out, and significant property damage occurred. Preliminary estimates indicate that the flood had a recurrence interval greater than 100 years.

On September 14, intense thunderstorms produced up to 16 inches of rain during a 24-hour period in a narrow band across south-central **Iowa**. The Governor declared six counties disaster areas. The heavy rainfall produced record high stages on three rivers. The Chariton River near Chariton reached a record stage of 29.3 feet, 6.2 feet higher than the previous record. South Fork Chariton River near Promise City set a record stage of 34.9 feet, 4.9 feet above the previous record. Thompson River at Davis City had a record discharge of about 55,000 cubic feet per second (ft^3/s), which broke the old record of 30,000 ft^3/s set in 1885.

On September 16, up to 8 inches of rain caused widespread flooding in south-central and southwestern **Wisconsin**. High water closed many roads and flooded homes and businesses in several localities. The Governor declared a state of emergency for southern Wisconsin. Flooding was most severe in Richland, Trempealeau, Vernon, Crawford, Columbia, and Buffalo Counties, where 2 to 8 inches of rain fell on September 16 after earlier heavy rains. High water caused damage along the Pine, Trempealeau, and Kickapoo Rivers.

Rains associated with a slowly moving cold front also caused major flooding in southern **Iowa**. Several peak flows occurred during the week as a result of intermittent heavy rains. Although peaks had a recurrence interval of less than 10 years, rainfall may have exceeded the 24-hour 100-year amounts locally. The Buffalo River near Mondovi and the

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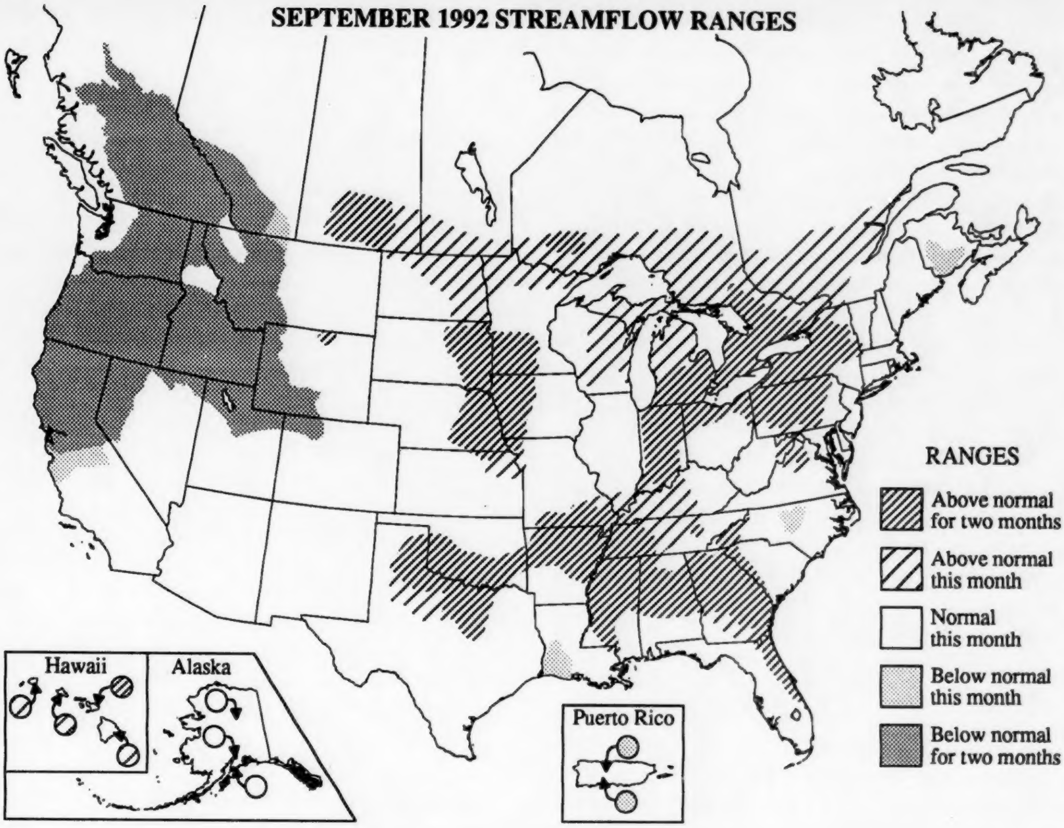
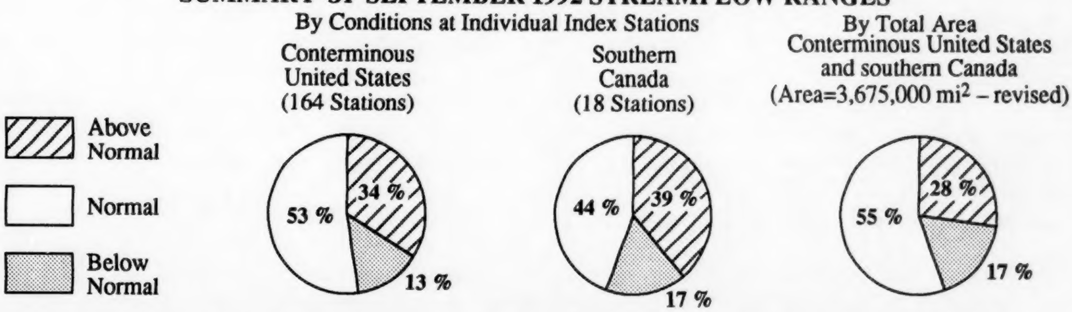
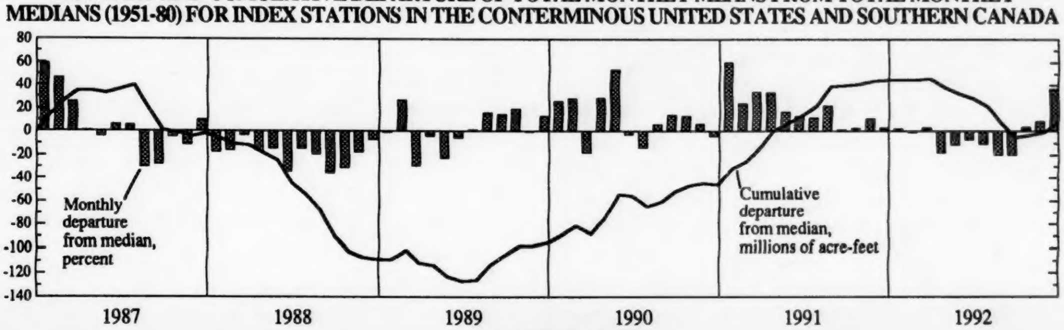
SEPTEMBER 1992 STREAMFLOW RANGES



SUMMARY OF SEPTEMBER 1992 STREAMFLOW RANGES



MONTHLY AND CUMULATIVE DEPARTURE OF TOTAL MONTHLY MEANS FROM TOTAL MONTHLY MEDIANS (1951-80) FOR INDEX STATIONS IN THE CONTERMINOUS UNITED STATES AND SOUTHERN CANADA



Pine River at Richland Center had peaks exceeding a 10-year flood. Damage estimates were incomplete, but an early estimate exceeded $10 million.

September streamflow decreased from that for August at 106 index stations, remained the same at 3 index stations, and increased at 83 index stations, resulting in normal to above-normal range streamflow at 84 percent of the 192 reporting index stations in the United States, southern Canada, and Puerto Rico during the month, compared with 81 percent of stations in those ranges during August, and 77 percent of stations in those ranges during September 1991.

Below-normal range streamflow occurred in 28 percent of the area of the conterminous United States and southern Canada during September, compared with 23 percent during August, and 22 percent (revised) during September 1991. Total flow of 493,100 ft^3/s during September for the 174 reporting index stations in the conterminous United States and southern Canada was 37 percent above median, 6 percent more than last month, and 33 percent more than flow during September 1991. This was the third consecutive month of above-median flow and the fifth for the water year, the others having been in October and December.

New September highs occurred at two stations—English River at Umfreville, Ontario, and Honopou Stream near Huelo, Maui, Hawaii—compared with three new minimums and two new maximums during August. The monthly mean of 6,652 ft^3/s (303 percent above median) on the English River exceeded that of 1988 by 632 ft^3/s. On Honopou Stream, the monthly mean of 14.7 ft^3/s (965 percent above median) exceeded that of 1914 by 2.5 ft^3/s. Hydrographs for the two stations at which new maximums occurred are on page 5. Also on page 5 are hydrographs for a station at which flow has been in the normal range for most of the past 26 months (Choptank River near Greensboro, Maryland), the two stations (Saline River near Russell, Kansas, and Wilson River near Tillamook, Oregon) at which the most new minimums occurred for the 1992 water year, and two stations (Guadalupe River near Spring Branch, Texas, and Rio Inabon at Real Abajo, Puerto Rico) at which several new maximums occurred.

The combined flow of the 3 largest rivers in the lower 48 States—Mississippi, St. Lawrence, and Columbia—averaged 960,200 ft^3/s, about 14 percent above median and in the normal range, after a 24 percent decrease in flow from August to September. Flow of the St. Lawrence River was in the above-normal range after 15 consecutive months in the normal range. Flow of the Mississippi River was in the above-normal range for the second consecutive month after two months in the below-normal range. Flow of the Columbia River was in the below-normal range for the fifth consecutive month (following three months in the normal range) and was the second lowest of adjusted record for September. Hydrographs for the combined and individual flows of the "Big 3" and a table of dissolved solids and water temperature data for four large river stations are on page 12. Flow data for the "Big 3" and 42 other large rivers are given in the Flow of Large Rivers table on page 13.

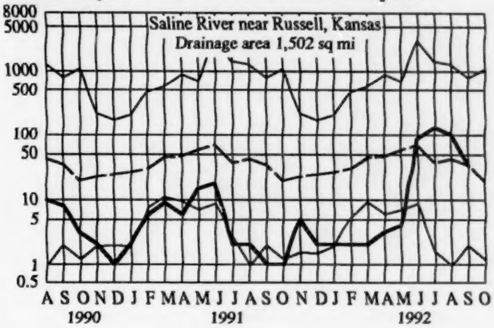
Month-end index reservoir contents were in the below-average range (below the month-end average for the period of record by more than 5 percent of normal maximum contents) at 33 of 100 reporting sites, compared with 31 of 100 during August, and 29 of 99 at the end of September 1991, including most reservoirs in Nova Scotia, New Jersey, Maryland, the Dakotas, Nebraska, Montana, Wyoming, Utah, Idaho, Nevada, California, and the Colorado River Storage Project. Contents were in the above-average range at 44 reservoirs (compared with 37 last month, and 41 a year ago), including most reservoirs in Quebec, Massachusetts, New York, the Carolinas, Georgia, Alabama, the Tennessee Valley, Minnesota, Oklahoma, Texas, New Mexico, and Arizona. Reservoirs with contents in the below-average range and significantly lower than last year (with normal maximum contents of at least 1,000,000 acre-feet) are: Lake Sakakawea, North Dakota; Lake Francis Case, South Dakota; Fort Peck, and Hungry Horse, Montana; Boise River, Idaho; Upper Snake River system, Idaho-Wyoming; the Pathfinder system, Wyoming; Bear Lake, Idaho-Utah; Ross and Franklin D. Roosevelt Lake, Washington; and also Folsom Lake and Lake Berryessa in California. Two reservoirs had no usable storage (September average in parentheses): Lake Tahoe (52), California-Nevada, for the 24th consecutive month, and Rye Patch (50), Nevada, for the 5th consecutive month. Three other reservoirs had contents below 10 percent of normal maximum near the end of the month (September average in parentheses): Belle Fourche, 6 percent (31), South Dakota; John Martin, 4 percent (16), Colorado; and Pine Flat, 3 percent (36), California. Graphs of contents for seven reservoirs are shown on page 14 and contents for the 100 reporting reservoirs are listed on page 15. Reservoir storage conditions near the end of September 1992 and September 1991 are shown on streamflow maps on page 17.

Mean September elevations at four master gages on the Great Lakes (provisional National Ocean Service data) were in the normal range on all four lakes but below median on Lake Superior and Lake Huron. Levels rose from those for August on Lake Superior and Lake Erie, but fell from those for August on Lake Michigan and Lake Ontario. September levels ranged from 0.16 foot higher (Lake Superior) to 0.16 foot lower (Lake Ontario) than those for August. Monthly means have now been in the normal range for 12 months on Lake Superior, 28 months on Lake Huron, 18 months on Lake Erie, and 5 months on Lake Ontario. September 1992 levels ranged from 0.09 foot (Lake Huron) to 0.93 foot higher (Lake Erie), than those for September 1991. Stage hydrographs for the master gages on Lake Superior, Lake Huron, Lake Erie, and Lake Ontario are on page 16.

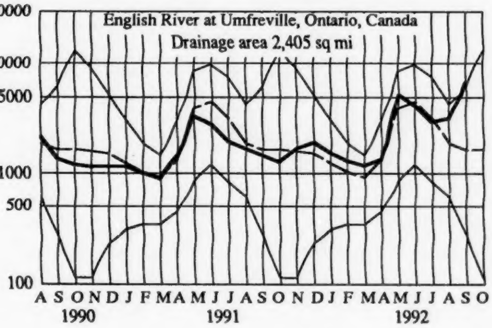
(Continued on page 11)

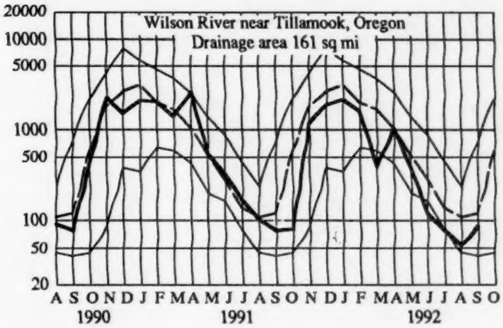
MONTHLY MEAN DISCHARGE OF SELECTED STREAMS

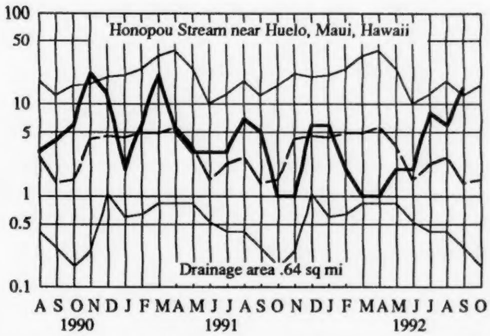
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.

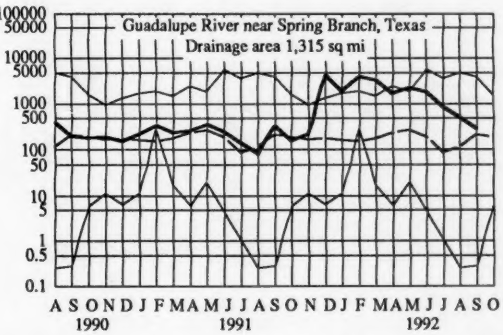


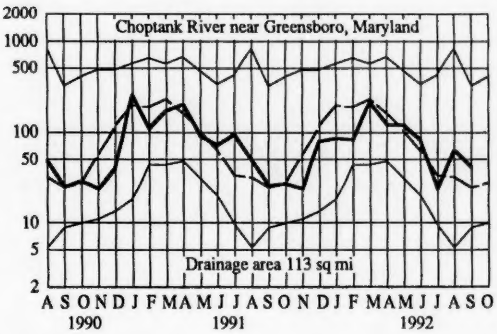
DISCHARGE, IN CUBIC FEET PER SECOND

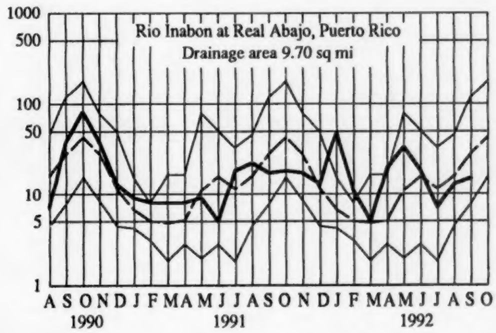






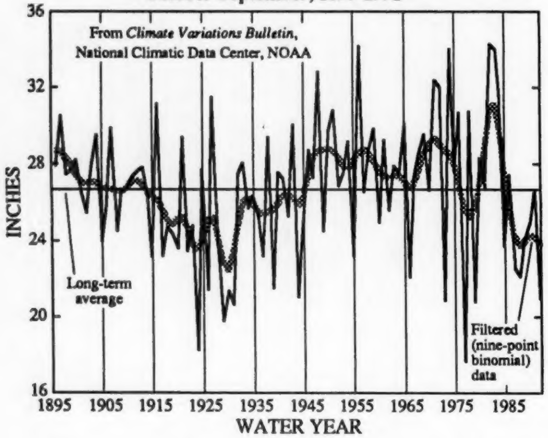




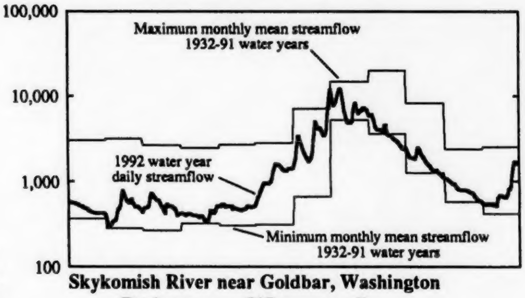


PACIFIC NORTHWEST (OREGON, WASHINGTON, IDAHO, AND MONTANA) HYDROLOGIC CONDITIONS

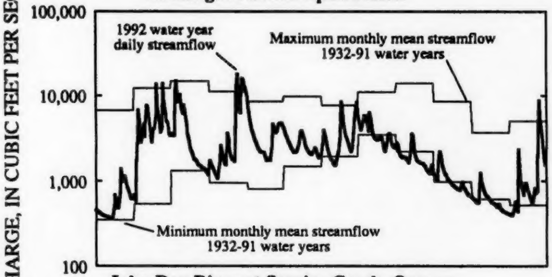
Northwest (Oregon, Washington, and Idaho) Precipitation
October-September, 1895-1992



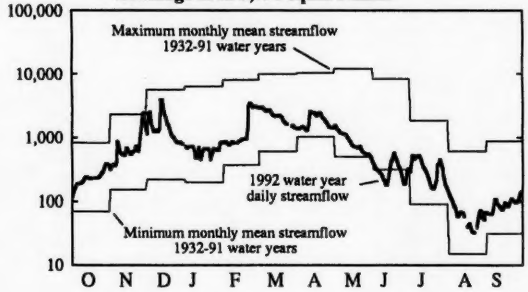
Middle Fork Flathead River near West Glacier, Montana
Drainage area 1,128 square miles



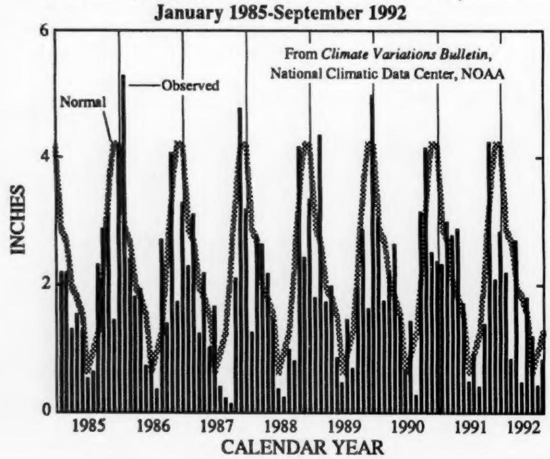
Skykomish River near Goldbar, Washington
Drainage area 535 square miles



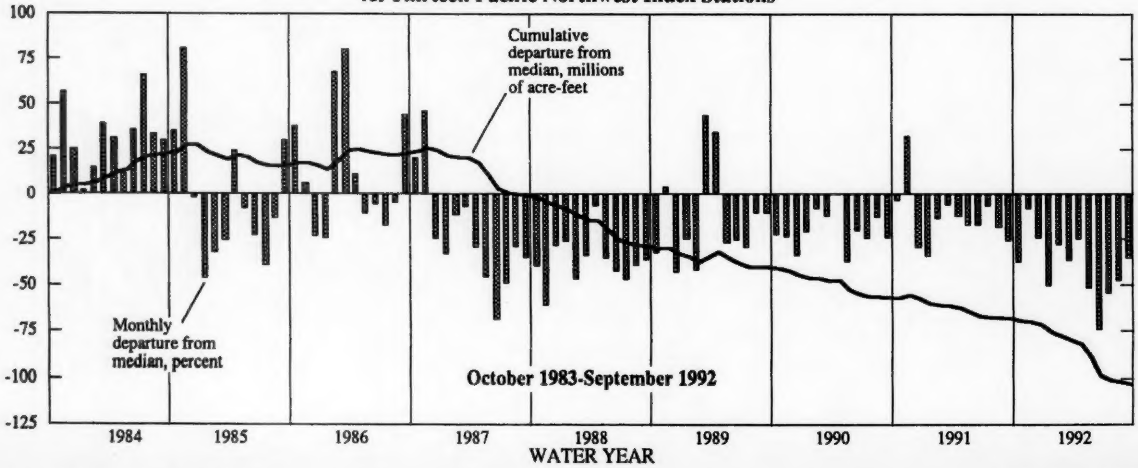
John Day River at Service Creek, Oregon
Drainage area 5,090 square miles



Northwest (Oregon, Washington, and Idaho) Precipitation
January 1985-September 1992



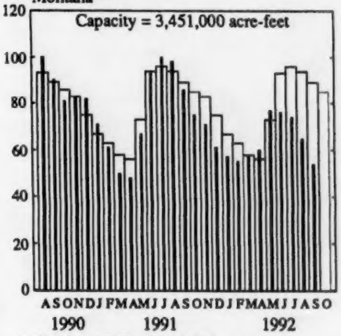
Monthly and Cumulative Departure Of Total Monthly Means From Total Monthly Median Streamflow
At Thirteen Pacific Northwest Index Stations



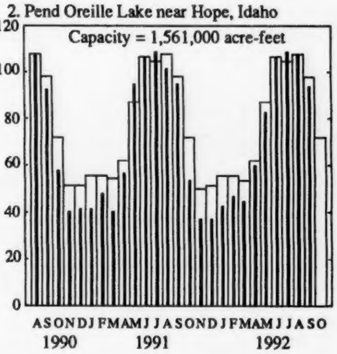
PACIFIC NORTHWEST (OREGON, WASHINGTON, IDAHO, AND MONTANA) RESERVOIR INDEX STATIONS

PERCENT OF NORMAL CAPACITY

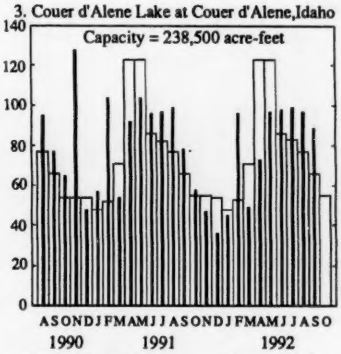
1. Hungry Horse reservoir near Hungry Horse, Montana



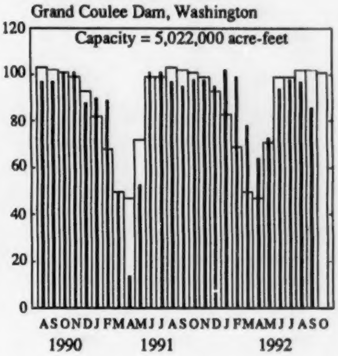
2. Pend Oreille Lake near Hope, Idaho



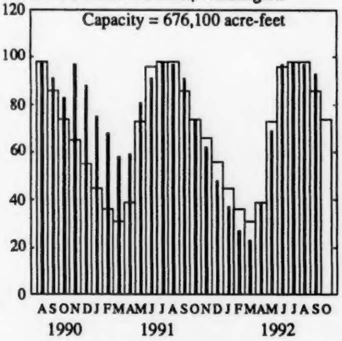
3. Couer d'Alene Lake at Couer d'Alene,Idaho



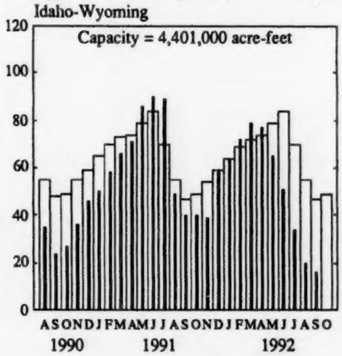
4. Franklin D. Roosevelt Lake at Grand Coulee Dam, Washington



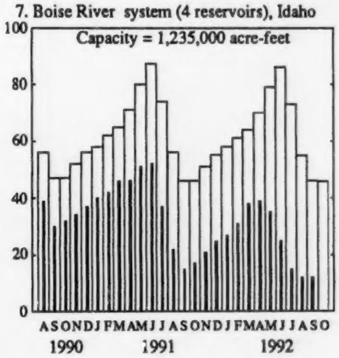
5. Lake Chelan at Chelan, Washington



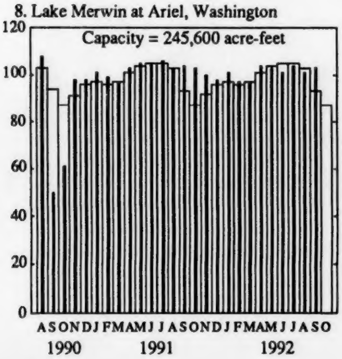
6. Upper Snake River system (8 reservoirs), Idaho-Wyoming



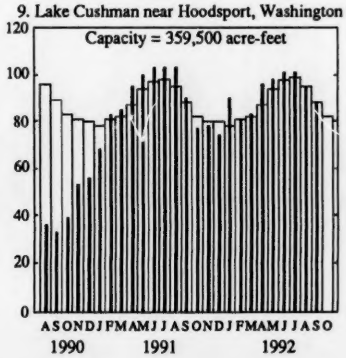
7. Boise River system (4 reservoirs), Idaho



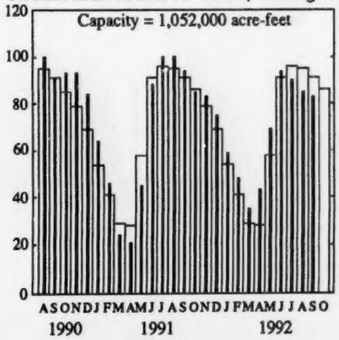
8. Lake Merwin at Ariel, Washington



9. Lake Cushman near Hoodsport, Washington

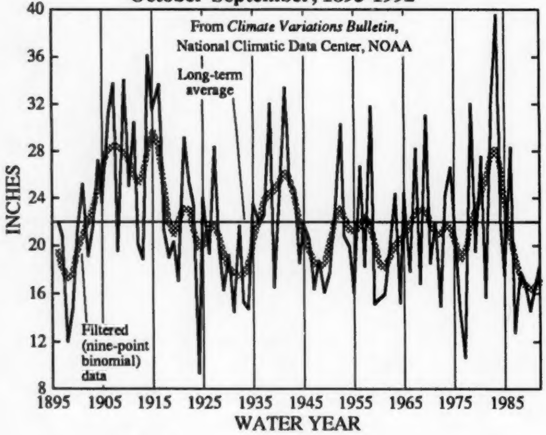


10. Ross reservoir near Newhalem, Washington

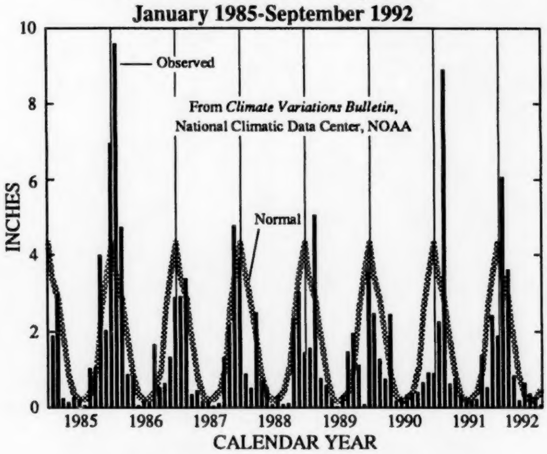


CALIFORNIA HYDROLOGIC CONDITIONS

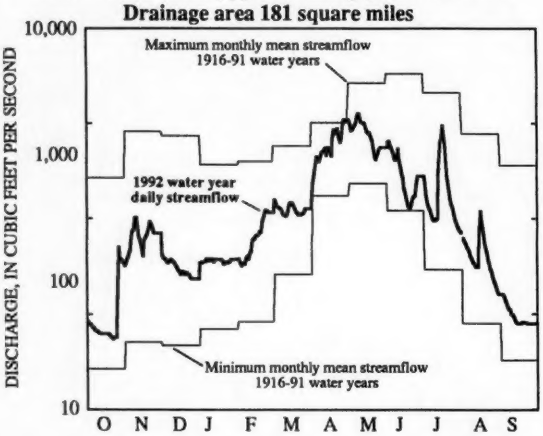
California Statewide Precipitation
October-September, 1895-1992



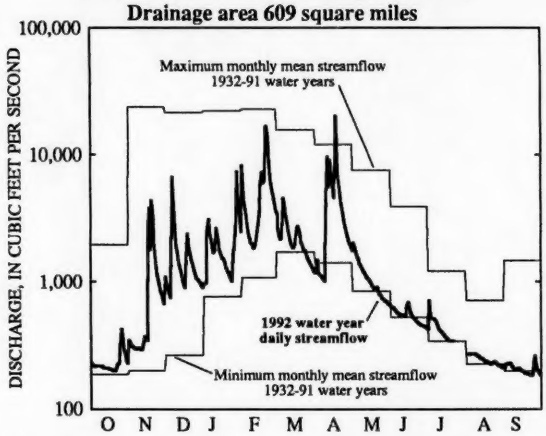
California Statewide Precipitation
January 1985-September 1992



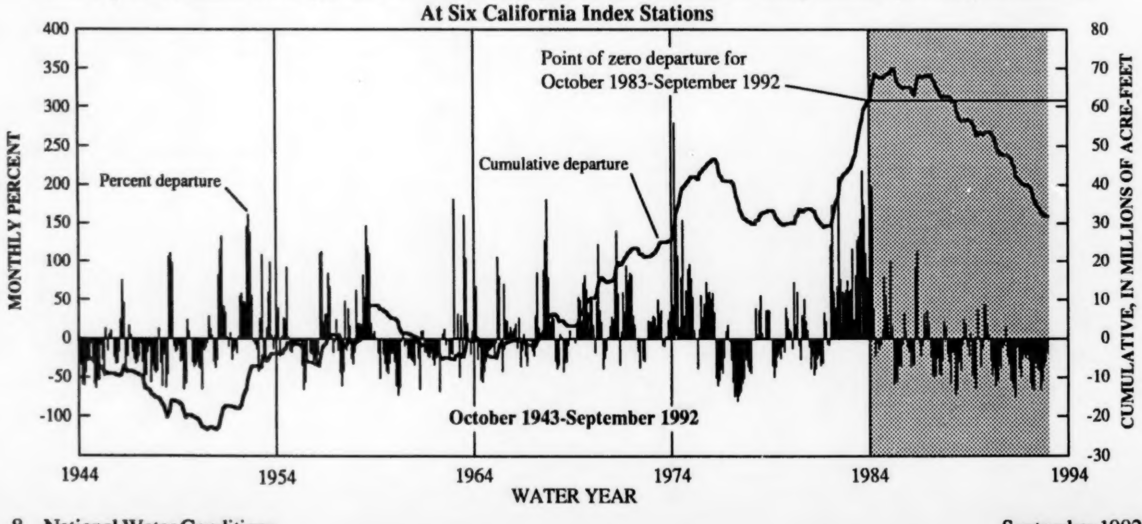
Merced River at Happy Isles Bridge, near Yosemite
Drainage area 181 square miles



Smith River near Crescent City, California
Drainage area 609 square miles

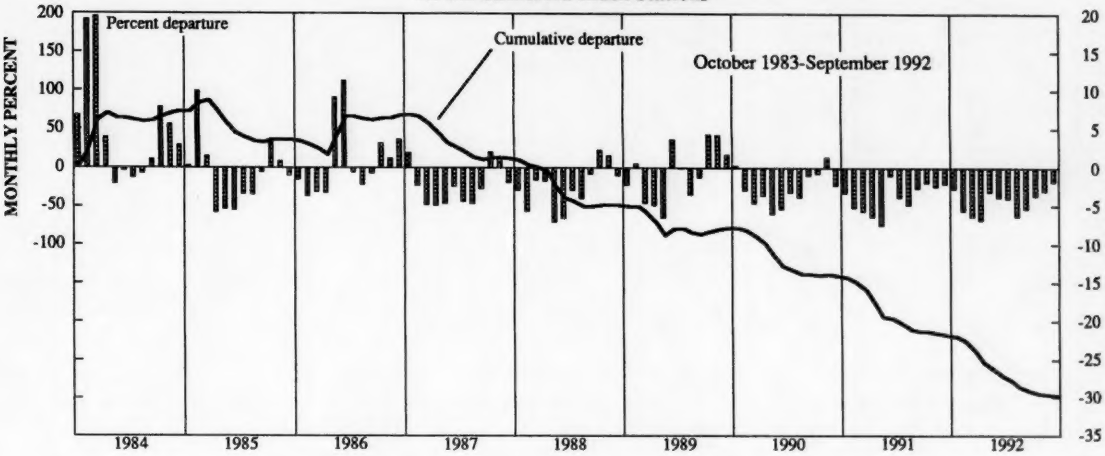


Monthly And Cumulative Departure Of Total Monthly Means From Total Monthly Median (1951-80) Streamflow
At Six California Index Stations

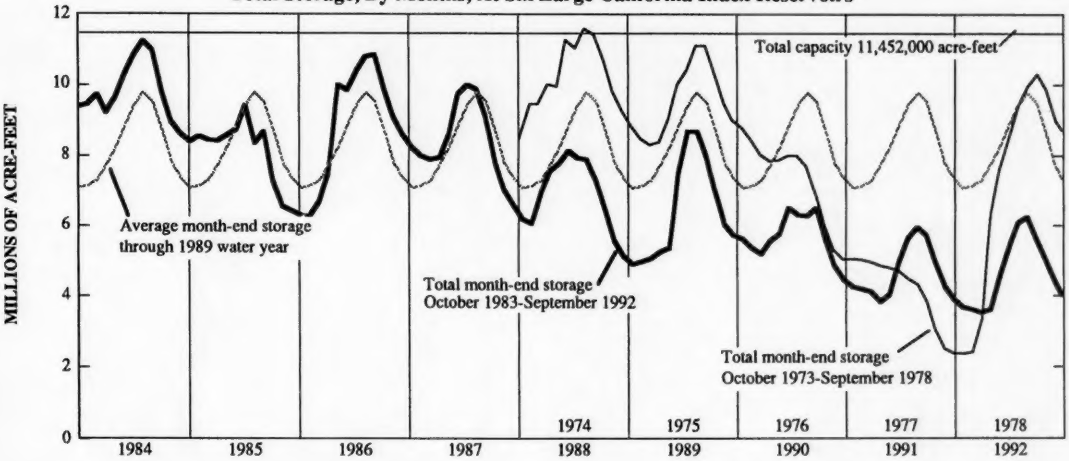


CALIFORNIA STREAMFLOW, COMBINED RESERVOIR CONTENTS, AND GROUND-WATER LEVELS

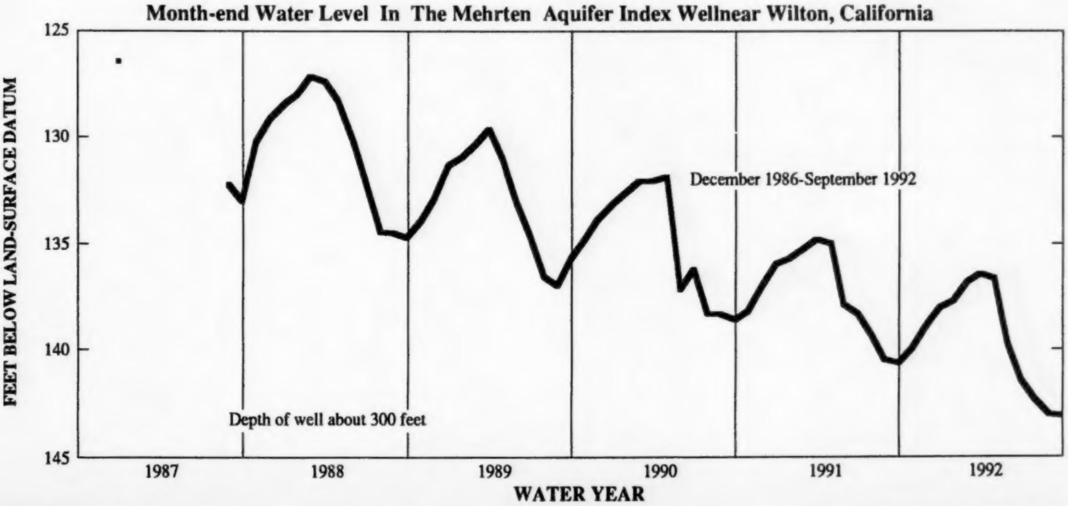
Monthly And Cumulative Departure Of Total Monthly Means From Total Monthly Median (1951-80) Streamflow At Six California Index Stations



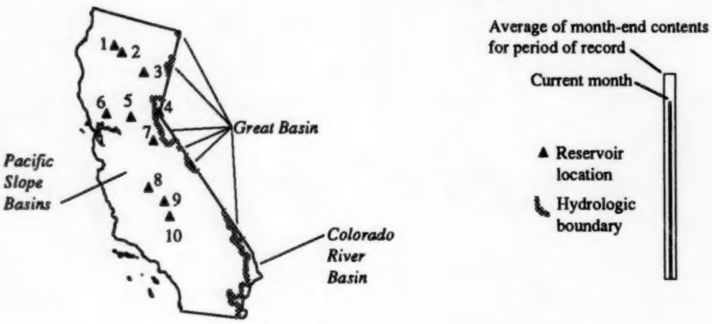
Total Storage, By Months, At Six Large California Index Reservoirs



Month-end Water Level In The Mehrten Aquifer Index Wellnear Wilton, California

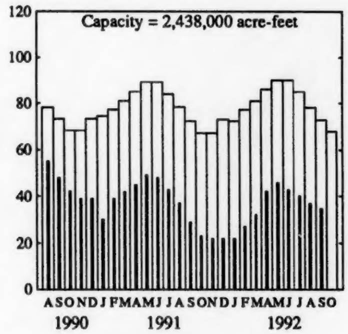


CALIFORNIA RESERVOIR INDEX STATIONS

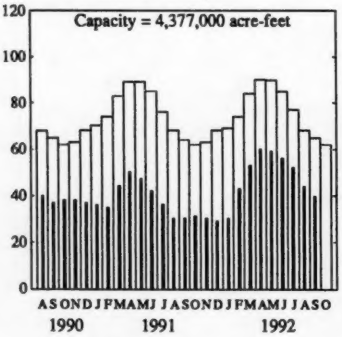


PERCENT OF NORMAL CAPACITY

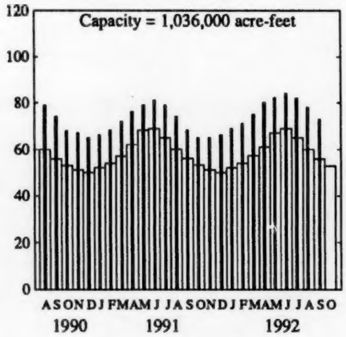
1. Clair Engle Lake near Lewiston



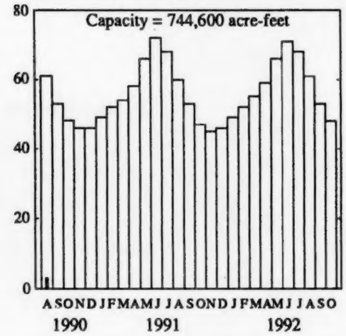
2. Shasta Lake near Redding



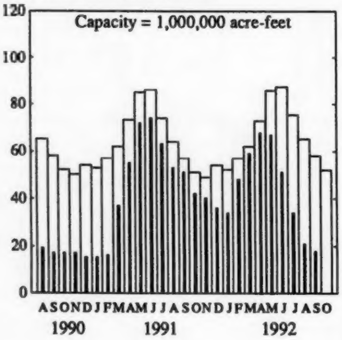
3. Lake Almanor near Prattville



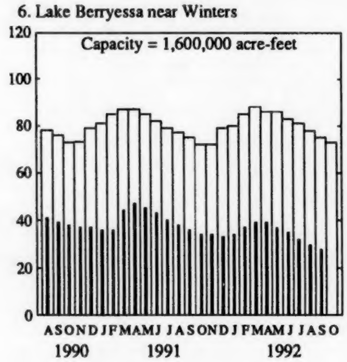
4. Lake Tahoe at Tahoe City



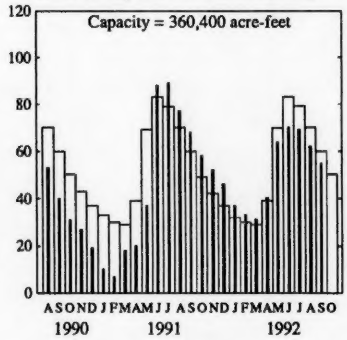
5. Folsom Lake near Folsom



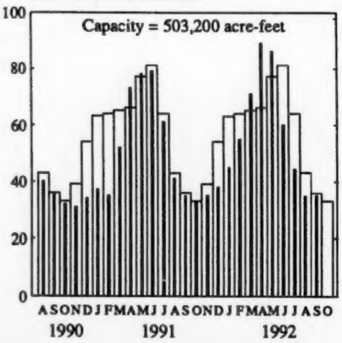
6. Lake Berryessa near Winters



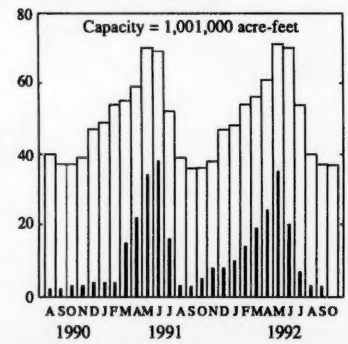
7. Hetch Hetchy reservoir at Hetch Hetchy



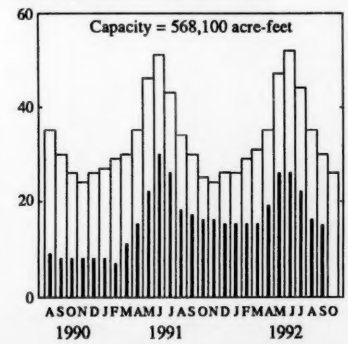
8. Millerton Lake at Friant



9. Pine Flat Lake near Piedra



10. Isabella Lake near Lake Isabella



Utah's Great Salt Lake level (graph on page 16) fell 0.40 foot, ending the month at 4,199.90 feet above National Geodetic Vertical Datum. Lake level was 1.60 feet lower than at the end of September 1991, and 11.95 feet lower than the maximum of record which occurred in June 1986 and March-April 1987.

Maps on page 17 show streamflow conditions during September 1992 and September 1991. September 1992 has about 47 percent more area in the above-normal range, about 23 percent less area in the below-normal range, and about 7 percent less area in the normal range than September 1991. Below-normal range streamflow occurred during both months in parts of California, Nevada, Oregon, Washington, Idaho, Wyoming, Colorado, and Puerto Rico. Above-normal range streamflow occurred during both months in parts of Hawaii, Saskatchewan, Texas, Oklahoma, Louisiana, Mississippi, Florida, Georgia, South Carolina, South Dakota, and Minnesota. Both maps also show reservoir storage near the end of the month at all reporting index reservoir stations for comparison with streamflow.

Graphs for 12 hydrologic areas (page 18) compare monthly streamflow for the 1991 and 1992 water years with median monthly streamflow for 1951-80 and also show (page 19) monthly percent departure of streamflow from median for the 1987-92 water years. Streamflow increased from that for August in the Hudson Bay, St. Lawrence River, Florida and Gulf of Mexico, Upper Mississippi River, and Columbia River basins; remained about the same in the Missouri River basin; and decreased in the other six basins. Streamflow was below median in the Colorado River, Great and other closed, Pacific Slope, and Columbia River basins, and above median in the other eight basins.

Maps on page 20 show streamflow conditions for summer 1992 and spring-summer 1992, and both maps also show reservoir storage near the end of September at all reporting index reservoir stations for comparison with streamflow.

WATER YEAR 1992 SUMMARY

The map at the top of page 21 shows streamflow conditions for water year 1992 and reservoir storage near the end of September at all reporting index reservoir stations for comparison with streamflow. The map at the bottom of page 21 shows the occurrence of new monthly streamflow extremes for water year 1992. Maps on page 22 show streamflow conditions for each quarter and half of water year 1992, and for water year 1992. Drought affected much of the West in the 1992 water year, as can be seen on the streamflow map for water year 1992. However, there was seasonal variation in the areas of below-normal range streamflow during the course of the year as shown by the maps on page 22. The core area of below-normal range streamflow encompassed southern Idaho, southwestern Oregon, northern California, northern Nevada, and northwestern Utah. The core area of above-normal range streamflow was an irregularly shaped area extending from the the Red River Valley along the Oklahoma-Texas border to the Gulf Of Mexico.

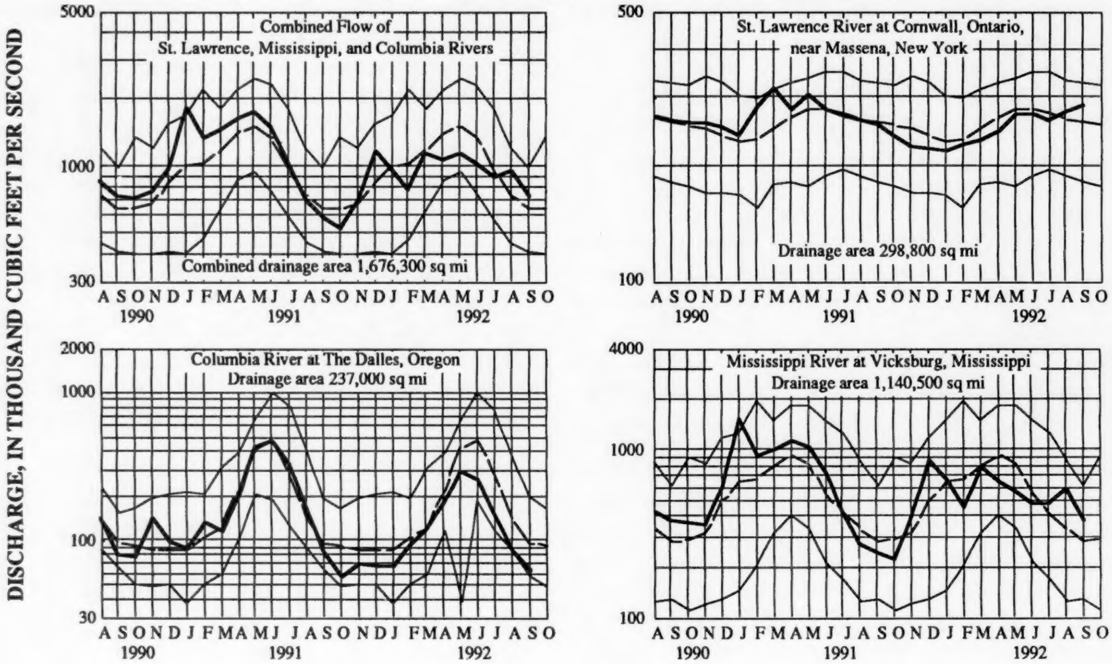
Hydrologic conditions in the Pacific Northwest (pages 6-7) and California (pages 8-10) are shown by graphs of precipitation, streamflow, and reservoir storage in both areas, and also by ground-water levels for the only index well in California. Collectively, Washington, Oregon, and Idaho reported their sixth driest January-September period on record in 1992. According to the *Climate Variations Bulletin*, October 1991-September 1992 for the Northwest climate division (Oregon, Washington, and Idaho) "ranks as the eighth driest such period on record, following a hydrologic year (1990-91) that was right at the normal. Five of the last six hydrologic years have been below the mean." According to the California Department of Water Resources, statewide precipitation was 86 percent of normal for the water year and reservoir storage was only 56 percent of normal at the end of the water year, while Sacramento River runoff was 8.9 million.acre-feet (about 46 percent of the 1941-90 average).

Floods also affected many areas during the water year, but the most severe were in Hawaii, on the island of Kauai during mid-December, when at least four persons were killed, damages were estimated at $1.6 billion, and several peaks of record exceeding the 100-year recurrence interval occurred; and in Puerto Rico during early January, when many were killed and injured, damages were in the millions of dollars, and several peaks of record exceeding the 100-year recurrence interval occurred. Other floods which caused deaths or damages occurred in: Connecticut, Virginia, Kentucky, Florida, and South Dakota during June; southeastern Kentucky during July; Indiana, Kentucky, North Carolina, and Oklahoma during August; and Alaska, Wisconsin, North Carolina, and Iowa during September. Hurricane Andrew caused extensive damage in both southern Florida and coastal Louisiana during August. Although no record floods occurred in the area, persistent storms coming in from the Pacific Ocean caused frequent low frequency flood peaks in an area extending from southern California to Oklahoma.

For water year 1992, the combined flow of the 3 largest rivers in the lower 48 States—Mississippi, St. Lawrence, and Columbia—averaged 924,700 ft^3/s, about 8 percent below median but in the normal range, and about 22 percent less than for water year 1991. Flow of the St. Lawrence River was in the normal range for the third consecutive water year. Flow of the Mississippi River was in the normal range after being in the above-normal range for two consecutive water years. Flow of the Columbia River was in the below-normal range after a normal-range 1991.

HYDROGRAPHS FOR THE "BIG THREE" RIVERS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.



Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR SEPTEMBER 1992 AT DOWNSTREAM SITES ON FIVE LARGE RIVERS

Station number	Station name	September data of following calendar years	Stream discharge during month: Mean (cfs)	Dissolved-solids concentration[1]: Minimum (mg/L)	Dissolved-solids concentration[1]: Maximum (mg/L)	Dissolved-solids discharge[1]: Mean (tons per day)	Dissolved-solids discharge[1]: Minimum (tons per day)	Dissolved-solids discharge[1]: Maximum (tons per day)	Water temperature[2]: Mean (°C)	Water temperature[2]: Minimum (°C)	Water temperature[2]: Maximum (°C)
01463500	Delaware River at Trenton,	1992	4,685	112	133	1,538	1,185	2,233	21.5	16.0	24.5
	New Jersey, (Morrisville,	1945-91	5,819	63	149	3,730	523	11,730	[3]21.5	14.0	32.0
	Pennsylvania)	(Extreme yr)		(1977)	(1965)		(1966)	(1987)			
			[4]4,272								
07289000	Mississippi River at	1992	375,300	246	262	256,600	227,300	306,200	26.0	19.5	24.5
	Vicksburg, Mississippi	1976-91	356,100	185	309	239,600	116,000	472,000	26.0	21.0	30.0
		(Extreme yr)		(1977)	(1987)		(1976)	(1979)			
			[4]281,700								
03612500	Ohio River at lock and dam 53,	1992	158,000	172	257	...	52,900	148,000	...	24.0	26.5
	near Grand Chain, Illinois,	1955-91	111,400	117	320	...	9,160	304,000	...	17.0	37.0
	(streamflow station at Metropolis,	(Extreme yr)		(1965)	(1990)		(1961)	(1975)			
	Illinois)		[4]89,720								
06934500	Missouri River at Hermann,	1992	74,330	269	410	66,900	53,500	98,700	24.5	20.0	26.0
	Missouri. (60 miles west of	1976-91	79,540	204	525	...	45,000	137,000	...	16.0	28.5
	St. Louis, Missouri)	(Extreme yr)		(1977)	(1983)		(1989)	(1986)			
			[4]54,090								
14128910	Columbia River at	1992	93,000	86	93	22,100	17,600	27,900	19.0	17.5	21.5
	Oregon (streamflow station at	1976-91	181,500	73	102	27,800	16,000	50,300	20.0	12.0	22.5
	The Dalles, Oregon)	(Extreme yr)		(1976)	(1977, 1979)		(1990)	(1976)			
			[4]96,870								

[1]Dissolved-solids concentrations, when not analyzed directly, are calculated on basis of measurements of specific conductance.

[2]To convert °C to °F: [(1.8 x °C) + 32] = °F.

[3]Mean for 8-year period (1983-91).

[4]Median of monthly values for 30-year reference period, water years 1951-80, for comparison with data for current month.

Provisional data; subject to revision

FLOW OF LARGE RIVERS DURING SEPTEMBER 1992

Station number	Stream and place of determination	Drainage area (square miles)	Average discharge through September 1985 (cubic feet per second)	September 1992: Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge 1951–80	Change in discharge from previous month (percent)	Discharge near end of month: Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,665	9,758	3,548	75	–59	3,140	2,030	30
01318500	Hudson River at Hadley, New York	1,664	2,908	† 1,840	168	31	1,600	1,030	30
01357500	Mohawk River at Cohoes, New York	3,456	5,683	† 3,150	191	8	3,200	2,070	30
01463500	Delaware River at Trenton, New Jersey	6,780	11,670	4,685	110	–17	5,150	3,330	30
01570500	Susquehanna River at Harrisburg, Pennsylvania	24,100	34,340	† 17,260	235	–15	29,700	19,200	29
01646500	Potomac River near Washington, District of Columbia	11,560	[1]11,500	† [1]4,630	170	11	...	...	...
02105500	Cape Fear River at William O. Huske Lock, near Tarheel, North Carolina.	4,852	5,002	1,130	63	–46	...	...	...
02131000	Pee Dee River at Peedee, South Carolina	8,830	9,871	3,903	76	–41	3,520	2,280	30
02226000	Altamaha River at Doctortown, Georgia	13,600	13,730	† 14,440	291	50	6,830	4,410	29
02320500	Suwannee River at Branford, Florida	7,880	6,986	5,864	117	19	4,450	2,880	30
02358000	Apalachicola River at Chattahoochee, Florida	17,200	22,420	† 13,860	118	8	12,900	8,340	30
02467000	Tombigbee River at Demopolis lock and dam, near Coatopa, Alabama.	15,385	23,520	† 12,160	316	13	4,200	2,710	30
02489500	Pearl River near Bogalusa, Louisiana	6,573	9,880	† 6,697	295	29	5,490	3,550	30
03049500	Allegheny River at Natrona, Pennsylvania	11,410	[1]19,580	† [1]18,840	469	4	20,100	13,000	28
03085000	Monongahela River at Braddock, Pennsylvania	7,337	[1]12,480	[1]3,897	121	–42	3,720	2,400	28
03193000	Kanawha River at Kanawha Falls, West Virginia	8,367	12,550	4,089	122	–27	3,000	1,900	29
03234500	Scioto River at Higby, Ohio	5,131	4,583	1,313	126	–66	673	434	30
03294500	Ohio River at Louisville, Kentucky[2] #	91,170	115,800	† 69,700	299	–37	48,400	31,300	...
03377500	Wabash River at Mount Carmel, Illinois	28,635	27,660	† 13,860	203	–52	21,600	14,000	30
03469000	French Broad River below Douglas Dam, Tennessee[3] #	4,543	[1]6,739	[1]4,038	143	–24	...	...	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wisconsin.[2]	6,010	4,238	† 5,626	263	227	7,850	5,070	30
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, New York.[4] #	298,800	243,900	† 286,000	110	4	270,000	175,000	30
02NG001	St. Maurice River at Grand Mere, Quebec	16,300	24,910	26,600	143	135	20,000	13,000	30
05082500	Red River of the North at Grand Forks, North Dakota	30,100	2,593	† 2,119	173	47	1,460	943	30
05133500	Rainy River at Manitou Rapids, Minnesota	19,400	12,920	† 29,800	283	113	31,000	20,000	25
05330000	Minnesota River near Jordan, Minnesota	16,200	3,680	† 4,758	501	–28	3,550	2,290	30
05331000	Mississippi River at St. Paul, Minnesota#	36,800	[1]11,020	10,460	168	–4	8,280	5,350	30
05365500	Chippewa River at Chippewa Falls, Wisconsin	5,650	5,149	3,170	99	59	2,300	1,490	30
05407000	Wisconsin River at Muscoda, Wisconsin	10,400	8,710	† 11,950	205	201	12,200	7,860	29
05446500	Rock River near Joslin, Illinois	9,549	6,080	5,350	181	58	5,850	3,780	30
05474500	Mississippi River at Keokuk, Iowa#	119,000	63,790	† 78,130	181	41	82,300	53,200	30
06214500	Yellowstone River at Billings, Montana	11,795	7,056	3,480	78	6	3,460	2,240	30
06934500	Missouri River at Hermann, Missouri#	524,200	80,880	74,330	137	–31	51,900	33,500	30
07289000	Mississippi River at Vicksburg, Mississippi[5] #	1,140,500	584,000	† 375,300	133	–37	450,000	291,000	30
07331000	Washita River near Dickson, Oklahoma	7,202	1,402	† 1,544	411	46	900	580	29
08276500	Rio Grande below Taos Junction Bridge, near Taos, New Mexico.	9,730	742	322	127	–19	311	201	30
09315000	Green River at Green River, Utah	44,850	6,391	1,841	67	3	...	...	...
11425500	Sacramento River at Verona, California	21,251	19,430	* 9,775	81	36	...	...	...
13269000	Snake River at Weiser, Idaho	69,200	18,520	* 6,830	51	28	8,310	5,370	30
13317000	Salmon River at White Bird, Idaho	13,550	11,390	* 2,780	60	–2	3,090	2,000	30
13342500	Clearwater River at Spalding, Idaho	9,570	15,510	3,050	99	19	3,780	2,440	30
14105700	Columbia River at The Dalles, Oregon[6] #	237,000	[1]193,500	* [1]64,440	67	–26	106,000	68,400	30
14191000	Willamette River at Salem, Oregon	7,280	[1]23,690	* [1]2,428	61	21	6,860	4,430	30
15515500	Tanana River at Nenana, Alaska	25,600	23,810	* 26,040	83	–53	20,000	13,000	30
08MF005	Fraser River at Hope, British Columbia	83,800	96,250	69,910	82	–23	109,000	70,300	30

#Indicates stations excluded from the combination bar/line graph. See Explanation of Data.

[1]Adjusted.

[2]Records furnished by Corps of Engineers.

[3]Records furnished by Tennessee Valley Authority.

[4]Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y., when adjusted for storage in Lake St. Lawrence.

[5]Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.

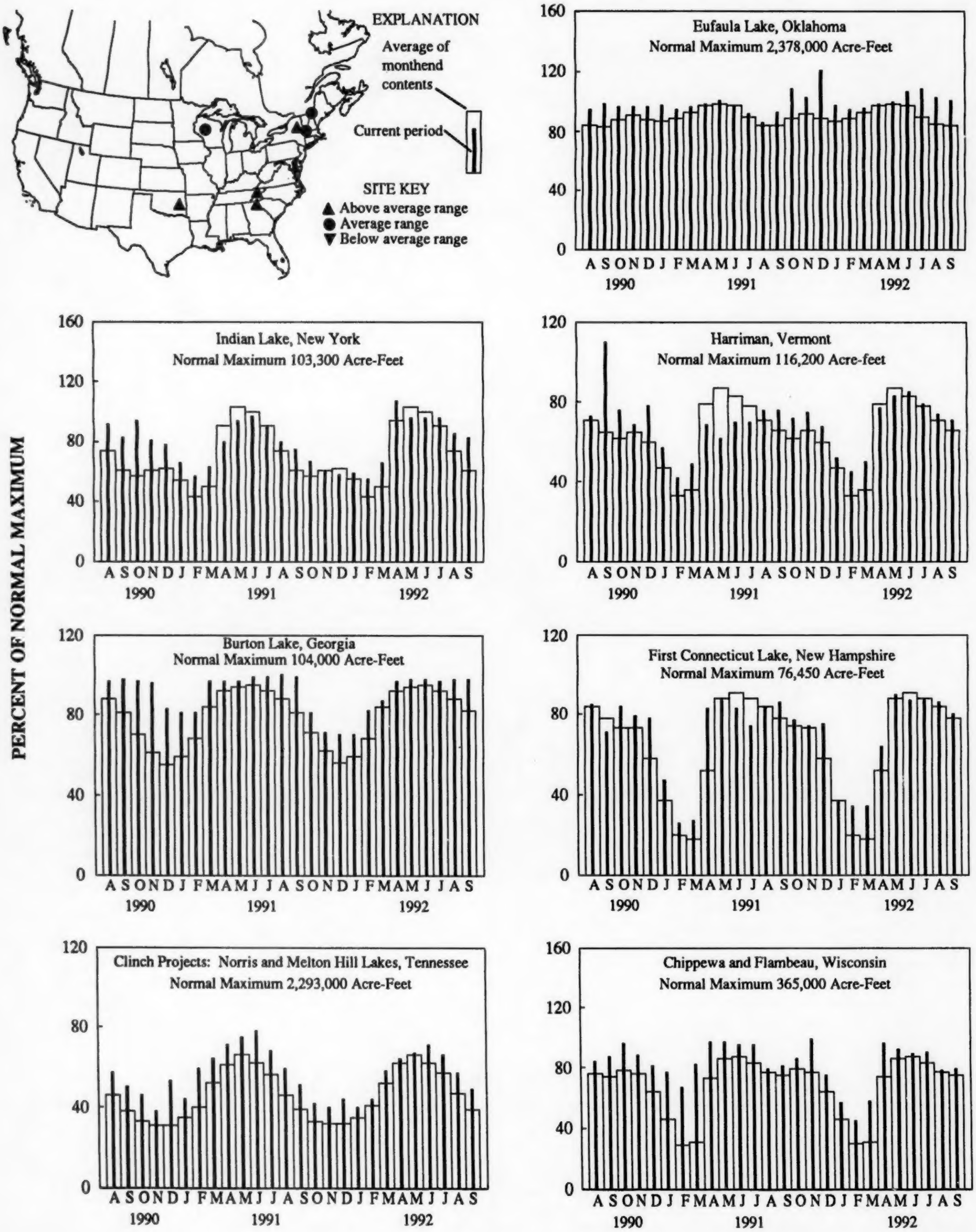
[6]Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

* Above–normal range

† Below–normal range

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF SEPTEMBER 1992

[Contents are expressed in percent of reservoir (system) capacity. The usable capacity of each reservoir (system) is shown in the column headed "Normal maximum"]



USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS NEAR END OF SEPTEMBER 1992

[Contents are expressed in percent of reservoir or reservoir system capacity. The usable capacity of reservoir or reservoir system is shown in the column headed "Normal maximum"]

Reservoir or reservoir system Principal uses: F-Flood control I-Irrigation M-Municipal P-Power R-Recreation W-Industrial	Percent of normal maximum: End of September 1992	End of September 1991	Average for end of September	End of August 1992	Normal maximum (acre-feet)[1]
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	† 28	...	49	32	[2]226,300
QUEBEC					
Allard (P)	* 90	68	69	85	280,600
Gouin (P)	* 79	66	69	70	6,954,000
MAINE					
Seven Reservoir Systems (MP)	63	63	59	77	4,107,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	80	86	78	86	76,450
Lake Francis (FPR)	78	95	77	79	99,310
Lake Winnipesaukee (PR)	* 76	71	65	83	165,700
VERMONT					
Harriman (P)	71	76	66	74	116,200
Somerset (P)	72	69	71	79	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	* 87	73	74	94	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	* 84	54	64	84	786,700
Indian Lake (FMP)	* 83	75	61	86	103,300
New York City Reservoir System (MW)	† 69	52	75	77	1,680,000
NEW JERSEY					
Wanaque (M)	† 61	37	68	72	85,100
PENNSYLVANIA					
Allegheny (FPR)	* 54	28	41	48	1,180,000
Pymatuning (FMR)	* 97	75	83	95	188,000
Raystown Lake (FR)	68	65	63	67	761,900
Lake Wallenpaupack (PR)	61	57	57	67	157,800
MARYLAND					
Baltimore Municipal System (M)	† 68	77	85	70	61,900
NORTH CAROLINA					
Bridgewater (Lake James) (P)	* 92	92	85	95	288,800
Narrows (Badin Lake) (P)	94	93	96	93	128,900
High Rock Lake (P)	* 83	78	66	79	234,800
SOUTH CAROLINA					
Lake Murray (P)	* 82	82	69	87	1,614,000
Lakes Marion and Moultrie (P)	* 84	87	69	87	1,777,000
SOUTH CAROLINA-GEORGIA					
Strom Thurmond Lake (FP)	* 78	75	57	71	1,730,000
GEORGIA					
Burton Lake (PR)	* 98	99	82	98	104,000
Sinclair (MPR)	* 93	86	83	91	214,000
Lake Sidney Lanier (FMPR)	* 62	60	53	60	1,686,000
ALABAMA					
Lake Martin (P)	* 91	91	79	96	1,375,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	* 49	51	39	57	2,293,000
Douglas Lake (FPR)	* 57	51	34	73	1,395,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3 Lake, and Parksville (FPR)	* 75	79	60	82	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	* 66	56	47	70	2,880,000
Little Tennessee Projects: Nantahala Lake, Thorpe, Fontana Lake, and Chilhowee Lake (FPR)	* 81	74	57	86	1,478,000
WISCONSIN					
Chippewa and Flambeau (PR)	79	81	75	78	365,000
Wisconsin River (21 Reservoirs) (PR)	* 72	75	64	57	399,000
MINNESOTA					
Mississippi River Headwater System (FMR)	* 39	39	32	40	1,640,000
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	† 61	67	86	62	22,700,000
SOUTH DAKOTA					
Angostura (I)	† 56	70	68	61	130,770
Belle Fourche (I)	† 6	12	31	7	185,200
Lake Francis Case (FIP)	† 59	79	73	86	4,589,000
Lake Oahe (FIP)	65	61	66	64	22,240,000
Lake Sharpe (FIP)	100	105	102	103	1,697,000
Lewis and Clark Lake (FIP)	† 90	101	106	92	432,000
NEBRASKA					
Lake McConaughy (IP)	† 49	44	66	49	1,948,000
OKLAHOMA					
Eufaula Lake (FPR)	* 101	93	84	103	2,378,000
Keystone Lake (FPR)	† 83	80	91	106	661,000
Tenkiller Ferry Lake (FPR)	* 104	100	92	110	628,200
Lake Altus (FIMR)	* 78	51	46	81	133,000
Lake O'The Cherokees (FPR)	* 99	89	83	96	1,492,000
OKLAHOMA-TEXAS					
Lake Texoma (FMPRW)	94	97	91	95	2,722,000
TEXAS					
Bridgeport (IMW)	* 94	90	51	95	386,400
Canyon Lake (FMR)	* 97	88	80	97	385,600
International Amistad (FIMPW)	* 97	105	84	97	3,497,000
International Falcon (FIMPW)	* 100	73	73	101	2,668,000
Livingston (IMW)	* 99	100	89	99	1,788,000
Possum Kingdom Lake (IMPRW)	† 90	94	96	93	570,200
Red Bluff (P)	* 46	20	26	48	307,000
Toledo Bend (P)	* 85	86	83	95	4,472,000
Twin Buttes (FIM)	* 77	34	34	78	177,800
Lake Kemp (IMW)	86	102	84	88	268,000
Lake Meredith (FMW)	43	39	40	43	796,900
Lake Travis (FIMPRW)	* 91	86	77	93	1,144,000
MONTANA					
Canyon Ferry Lake (FIMPR)	† 71	76	85	73	2,043,000
Fort Peck Lake (FPR)	† 57	65	86	57	18,910,000
Hungry Horse (FIPR)	† 54	86	89	65	3,451,000
WASHINGTON					
Ross (PR)	† 83	94	91	85	1,052,000
Franklin D. Roosevelt Lake (IP)	† 86	95	101	97	5,022,000
Lake Chelan (PR)	* 93	91	86	97	676,100
Lake Cushman (PR)	88	90	88	95	359,500
Lake Merwin (P)	* 103	104	94	101	245,600
IDAHO					
Boise River (4 Reservoirs) (FIP)	† 12	15	46	12	1,235,000
Coeur d'Alene Lake (P)	* 89	78	66	97	238,500
Pend Oreille Lake (FP)	87	87	90	99	1,561,000
IDAHO-WYOMING					
Upper Snake River (8 Reservoirs) (MP)	† 16	40	47	20	4,401,000
WYOMING					
Boysen (FIP)	† 73	88	84	75	802,000
Buffalo Bill (IP)	† 65	65	78	79	421,300
Keyhole (F)	† 10	16	41	10	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	† 24	33	45	28	3,056,000
COLORADO					
John Martin (FIR)	† 4	3	16	5	364,400
Taylor Park (IR)	* 69	80	63	76	106,200
Colorado-Big Thompson Project (I)	57	57	59	60	730,300
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	† 62	65	82	63	31,620,000
UTAH-IDAHO					
Bear Lake (IPR)	† 16	31	60	17	1,421,000
CALIFORNIA					
Folsom Lake (FIMPR)	† 18	52	57	21	1,000,000
Hetch Hetchy (MP)	55	68	60	62	360,400
Isabella (FIR)	† 15	17	30	16	568,100
Pine Flat Lake (FIR)	† 3	4	36	3	1,001,000
Clair Engle Lake (Lewiston) (FP)	† 35	29	71	37	2,438,000
Lake Almanor (P)	* 73	68	57	78	1,036,000
Lake Berryessa (FIMRW)	† 28	36	74	30	1,600,000
Millerton Lake (FI)	34	36	36	35	503,200
Shasta Lake (FIPR)	† 40	30	64	44	4,377,000
CALIFORNIA-NEVADA					
Lake Tahoe (IMPRW)	† 0	0	52	0	744,600
NEVADA					
Rye Patch (I)	† 0	1	50	0	194,300
ARIZONA-NEVADA					
Lake Mead and Lake Mohave (FIMP)	75	74	74	75	27,970,000
ARIZONA					
San Carlos (IP)	* 57	37	20	59	935,100
Salt and Verde River System (IMPR)	* 72	77	41	76	2,019,100
NEW MEXICO					
Conchas Lake (FIR)	89	87	85	94	315,700
Elephant Butte and Caballo (FIPR)	* 82	71	37	84	2,394,000

[1] 1 acre-foot = 0.04356 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second per day.

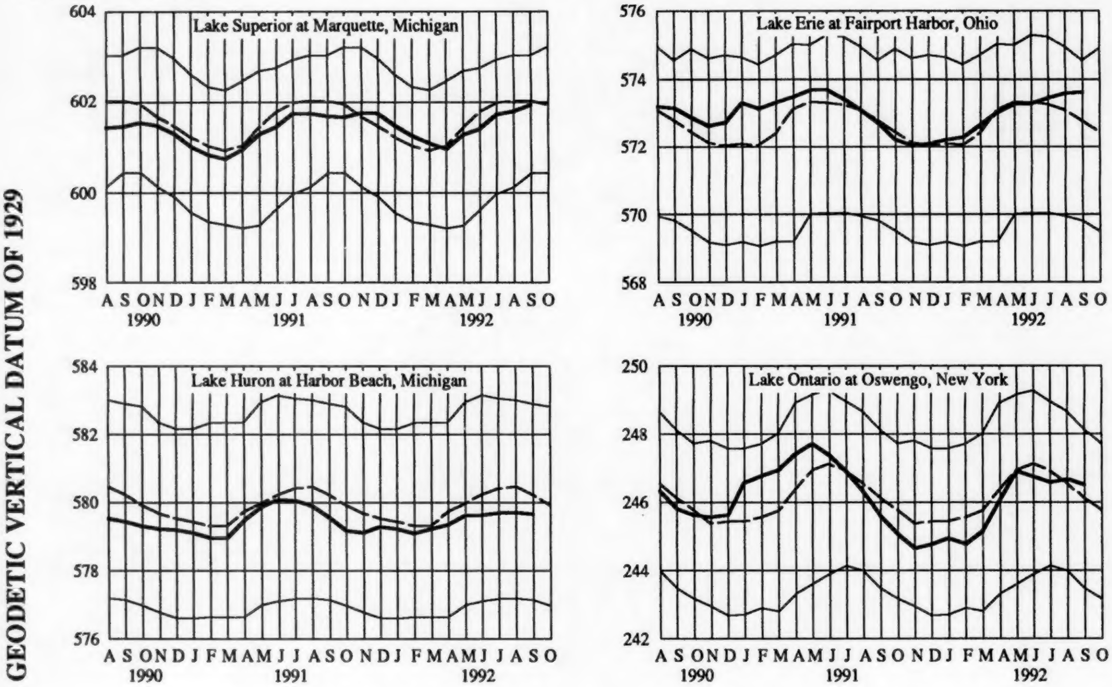
[2] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

* Above-average range

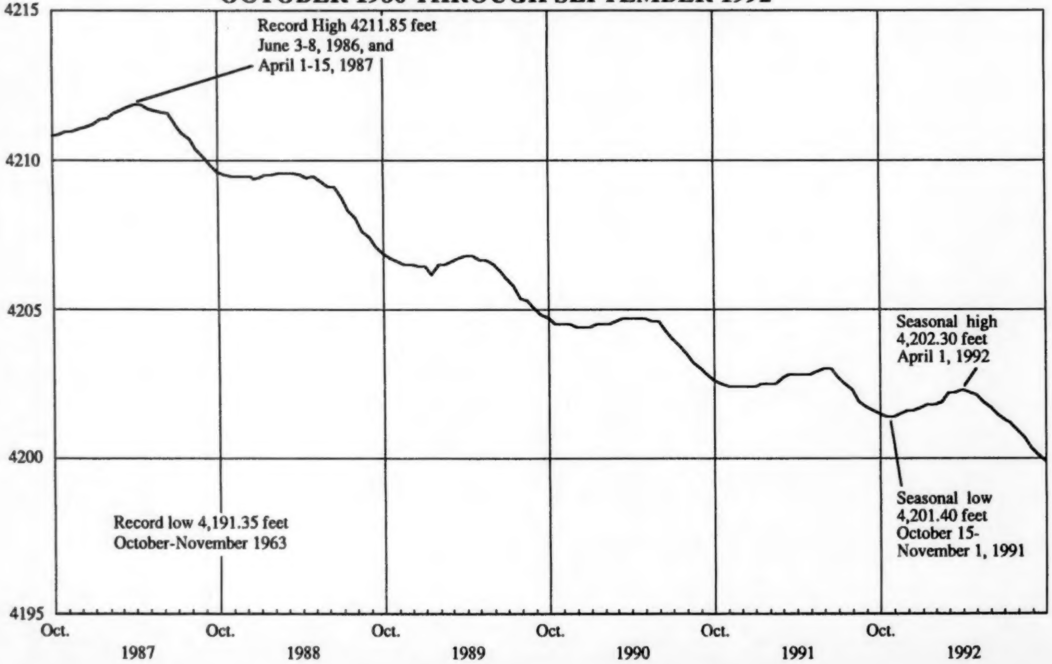
† Below-average range

GREAT LAKES ELEVATIONS

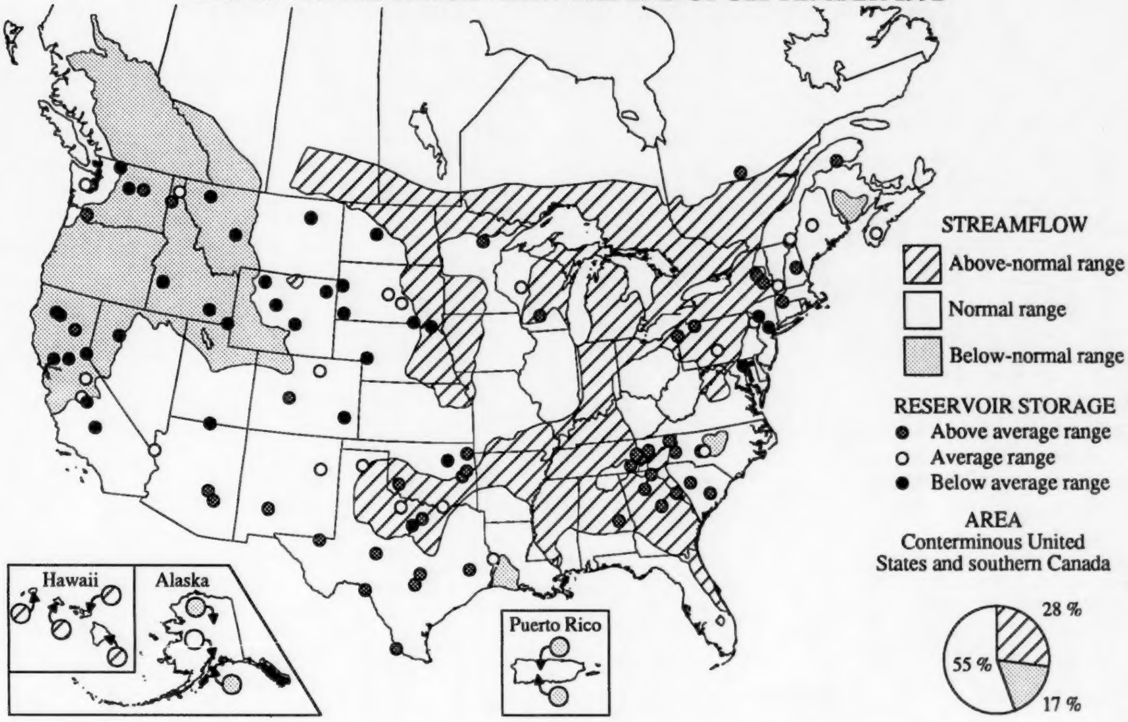
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period. Data from National Ocean Service.



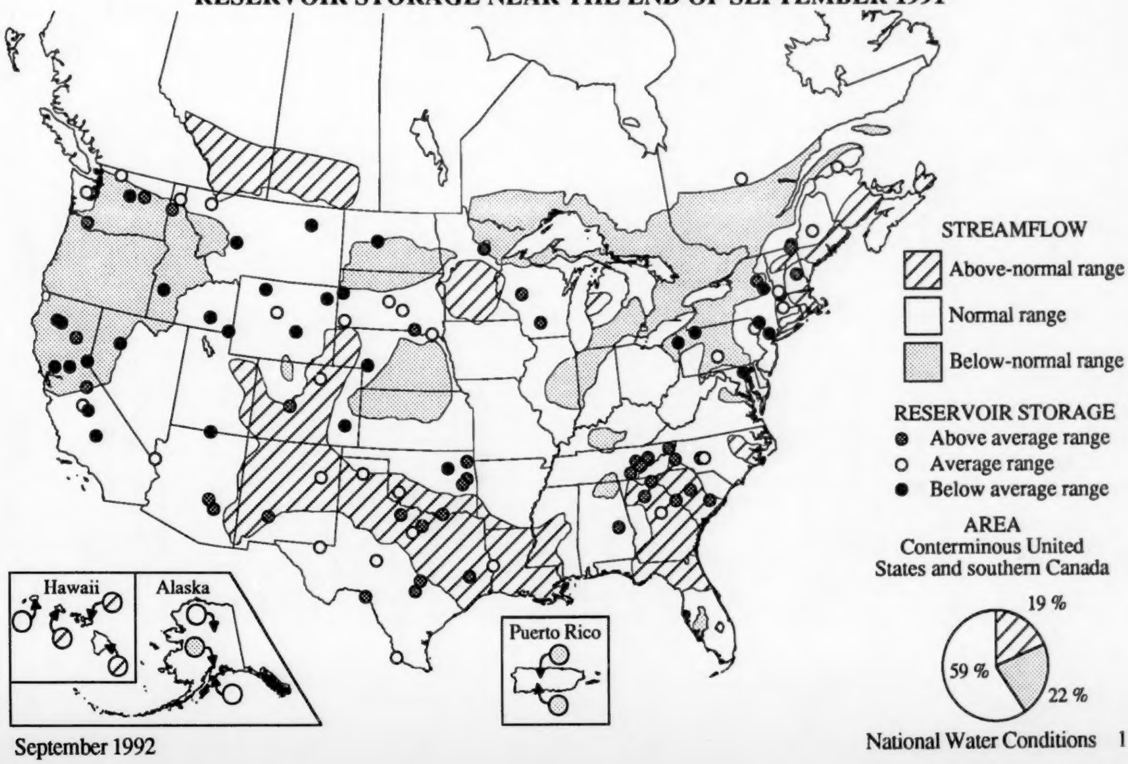
FLUCTUATIONS OF THE GREAT SALT LAKE, OCTOBER 1986 THROUGH SEPTEMBER 1992



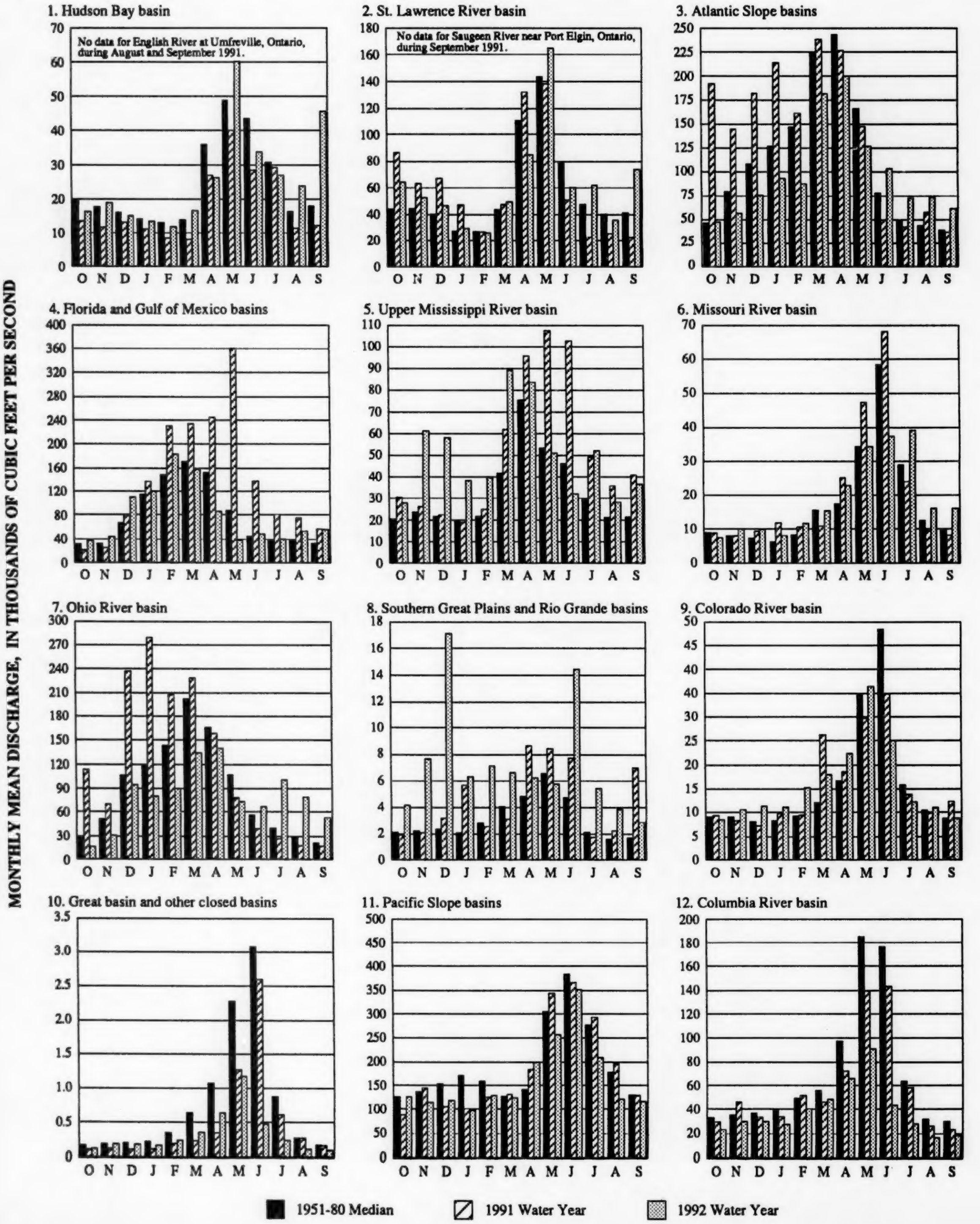
STREAMFLOW DURING SEPTEMBER 1992 AND RESERVOIR STORAGE NEAR THE END OF SEPTEMBER 1992



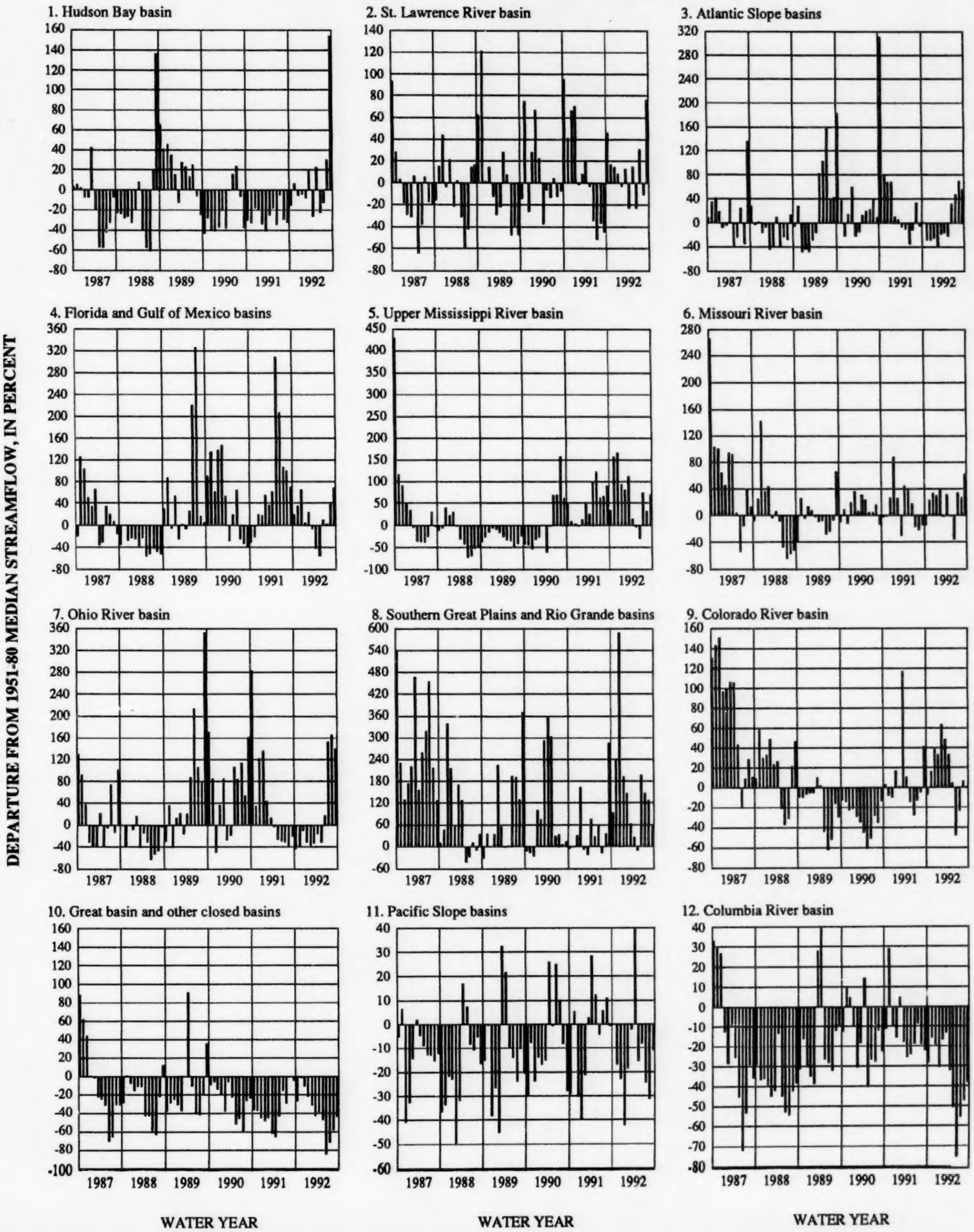
STREAMFLOW DURING SEPTEMBER 1991 AND RESERVOIR STORAGE NEAR THE END OF SEPTEMBER 1991



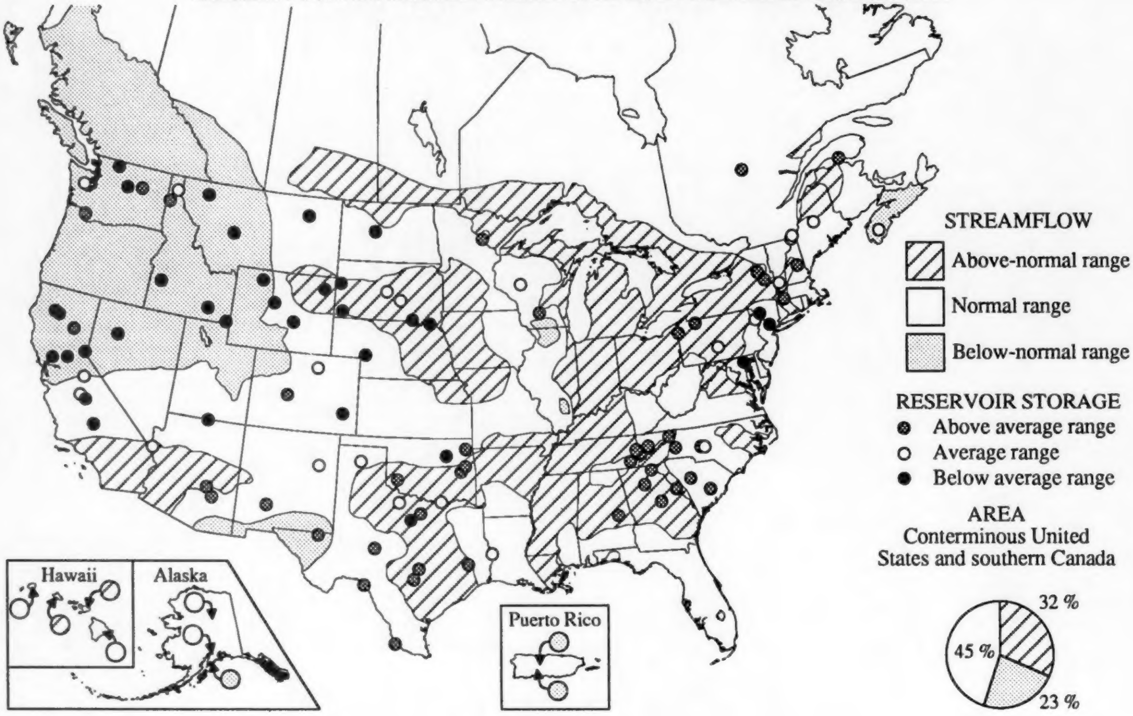
ACTUAL MONTHLY STREAMFLOW, 1991 AND 1992 WATER YEARS, COMPARED WITH MEDIAN MONTHLY STREAMFLOW, 1951-80



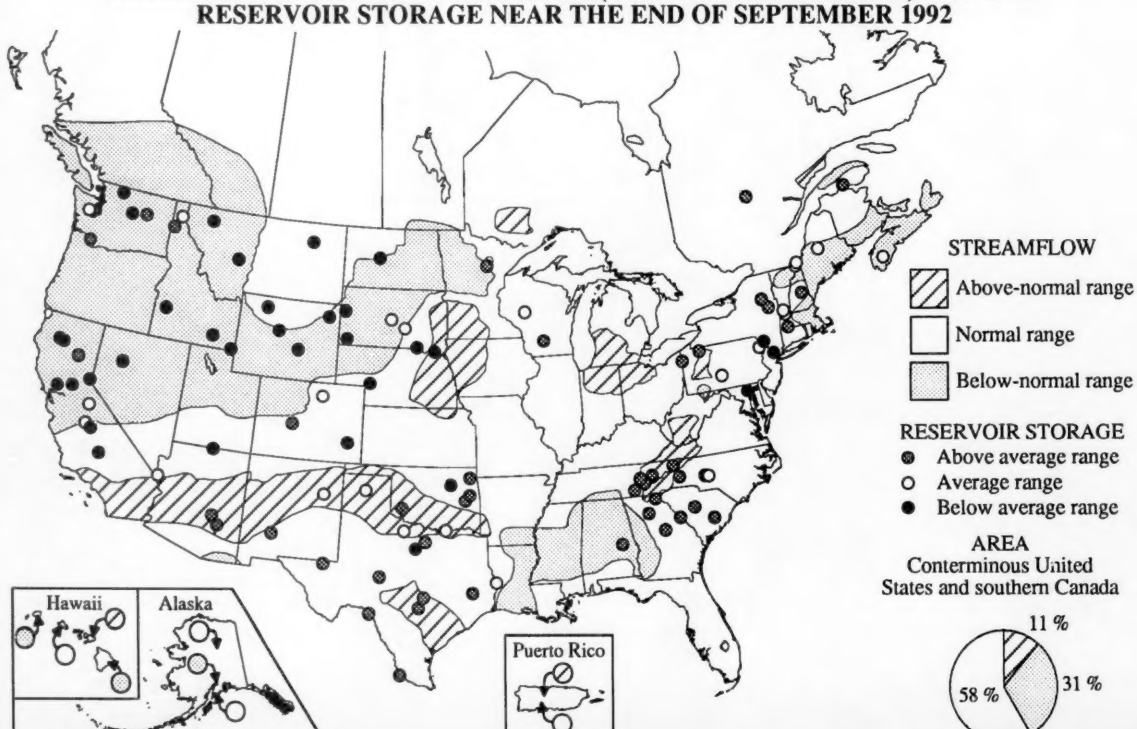
MONTHLY DEPARTURE OF ACTUAL STREAMFLOW (OCTOBER 1986-SEPTEMBER 1992) FROM MEDIAN STREAMFLOW (1951-80)



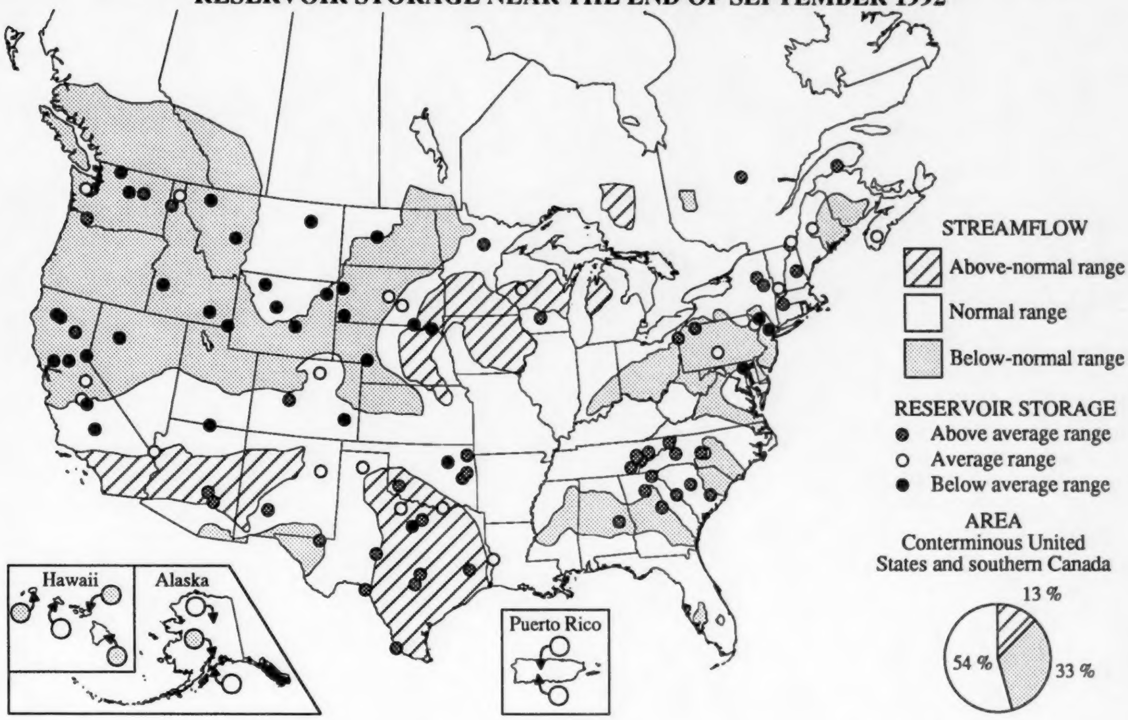
STREAMFLOW FOR SUMMER (JULY 1-SEPTEMBER 30) 1992 AND RESERVOIR STORAGE NEAR THE END OF SEPTEMBER 1992



STREAMFLOW FOR SPRING-SUMMER (APRIL 1-SEPTEMBER 30) 1992 AND RESERVOIR STORAGE NEAR THE END OF SEPTEMBER 1992



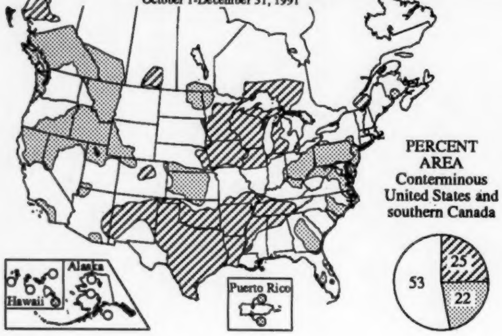
STREAMFLOW FOR WATER YEAR 1992 (OCTOBER 1, 1991-SEPTEMBER 30, 1992) AND RESERVOIR STORAGE NEAR THE END OF SEPTEMBER 1992

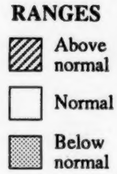


NEW MONTHLY STREAMFLOW EXTREMES FOR WATER YEAR 1992

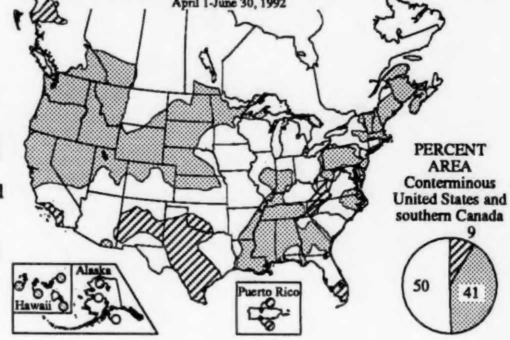
STREAMFLOW MAPS FOR THE 1992 WATER YEAR

STREAMFLOW FOR FALL
October 1-December 31, 1991

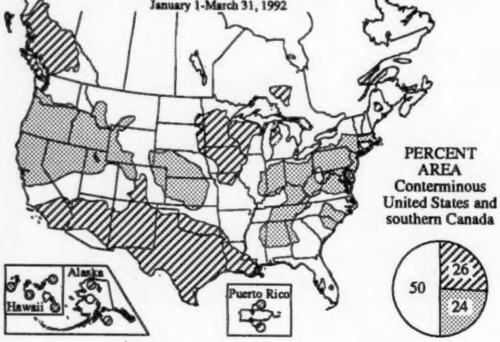




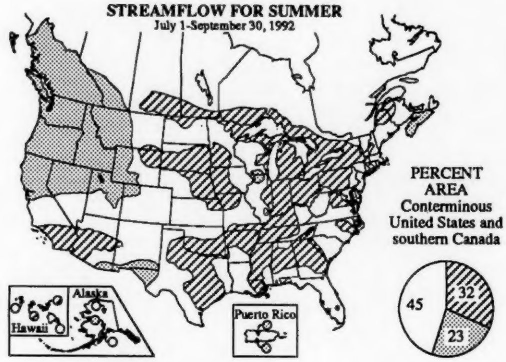
STREAMFLOW FOR SPRING
April 1-June 30, 1992



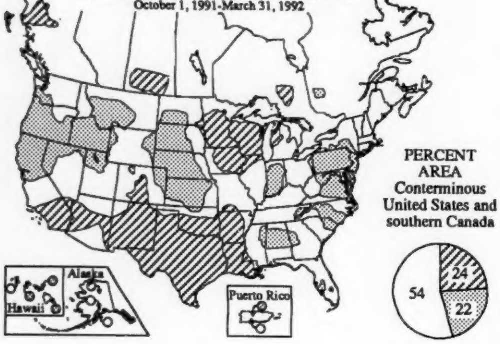
STREAMFLOW FOR WINTER
January 1-March 31, 1992



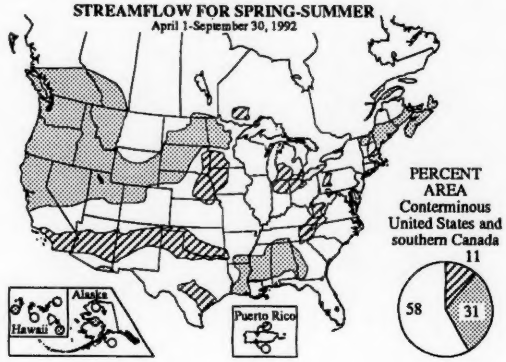
STREAMFLOW FOR SUMMER
July 1-September 30, 1992



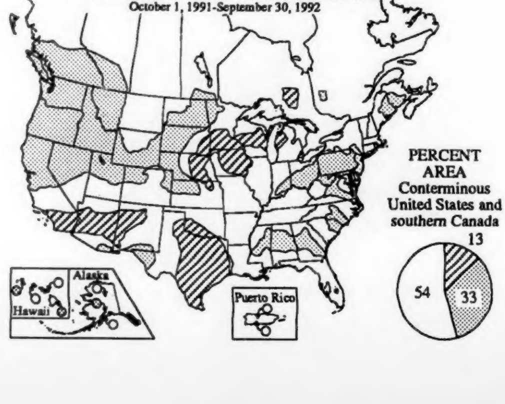
STREAMFLOW FOR FALL-WINTER
October 1, 1991-March 31, 1992



STREAMFLOW FOR SPRING-SUMMER
April 1-September 30, 1992



STREAMFLOW FOR WATER YEAR 1992
October 1, 1991-September 30, 1992



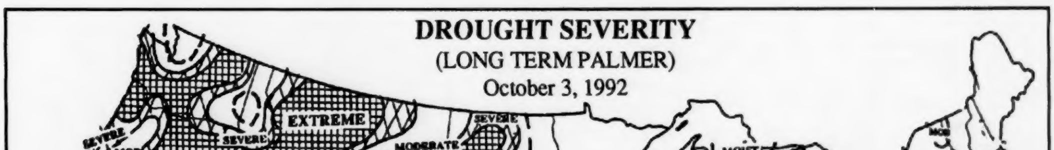
SEPTEMBER WEATHER SUMMARY

Although frosty airmasses grazed the northern Corn Belt at regular intervals, most of the Midwest escaped September without freeze damage. However, a late-month freeze in the Dakotas and the upper Mississippi Valley (MN, WI, northern IA) locally affected crop conditions. Elsewhere, weather headlines were generated by compact, intense systems such as Hurricane "Iniki" in Hawaii (September 11) and a thunderstorm complex over south-central Iowa (September 14-15).

Temperatures remained cool in many areas east of the Rockies, continuing a trend that developed this spring. Departures reached -3 °F in parts of the Midwest. But those early autumn conditions paled next to interior Alaska's wintery weather. Bitter cold and snow arrived during the second week of September, freezing summer in its tracks. Fairbanks had its coldest September on record (average temperature of 31.7 °F) more than 6 °F colder than the previous mark set in 1908. More than 2 feet of snow fell (another September record), and the temperature failed to top 40 °F during the last 20 days of the month. In sharp contrast, temperatures averaged mostly above normal in the Western Contiguous States. The monthly average temperature of 92 °F in Phoenix, AZ, was 5 °F above normal.

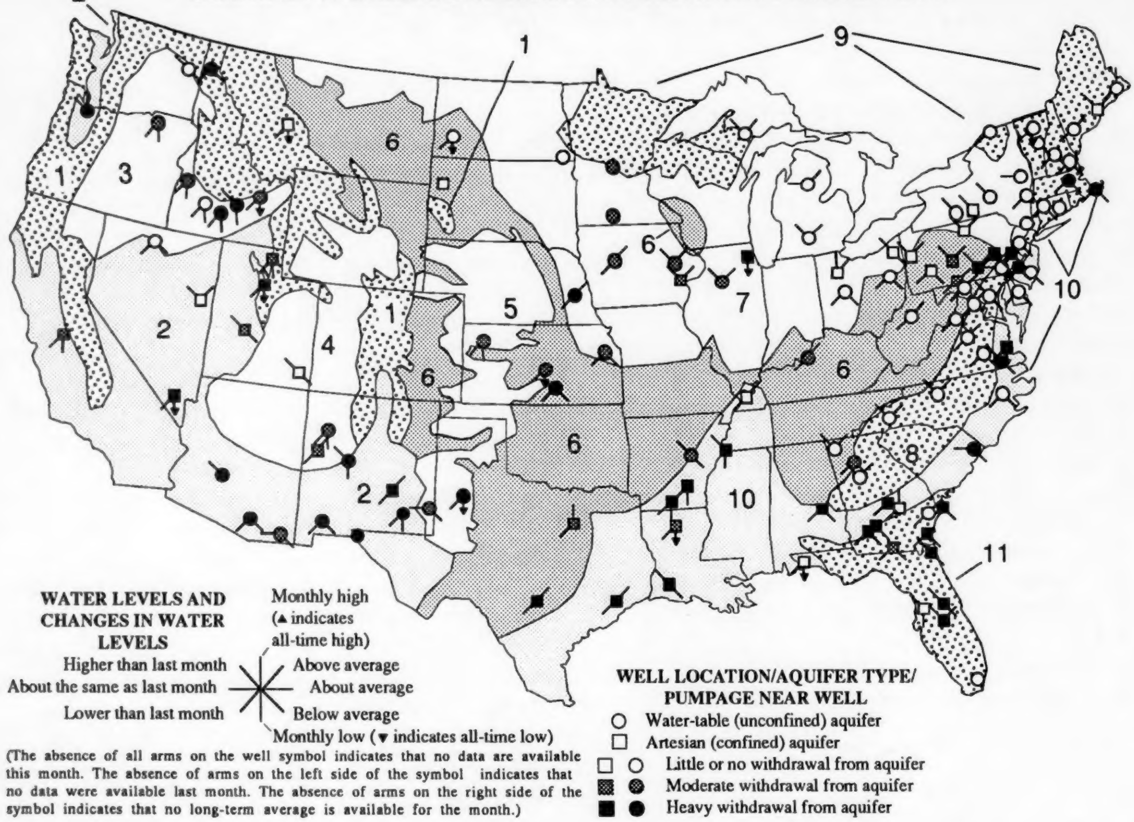
Significant precipitation in the West was primarily confined to the Cascades and the Rockies. At lower elevations, cold fronts produced gusty winds and raised dust. Wildfires returned to California late in the month during a spell of breezy, dry weather. Adequate to surplus moisture fell on the eastern half of the Nation. In the southeastern Plains, slow-moving fronts dropped up to twice the normal rainfall. Up to 17 inches of rain fell in southeastern Oklahoma. Local areas of south-central Iowa received nearly that much rain in less than 24 hours on the night of September 14-15. Thayer, IA, reported an unofficial total of 16 inches. Heavy rain fell over southeastern Minnesota and central Wisconsin during the next evening, resulting in totals of up to 12 inches.

Three tropical systems affected the United States during September. On September 11, Hurricane "Iniki" devastated Kauai Island, HI, with 130 miles per hour sustained winds. Kauai (population 51,000) endured severe damage to crops and infrastructure. According to press reports, 7,000 homes were left uninhabitable and the island's sugarcane, tropical fruit, and nut crops sustained damage. The other storms, tropical storm "Danielle" and a tropical depression, left their mark through beach erosion. "Danielle" made landfall in southeastern Virginia on September 25, churning the Atlantic north of its center. The depression which later became tropical storm "Earl" caused coastal flooding and beach erosion in northeastern Florida.



(From *Weekly Weather and Crop Bulletin*, NOAA/USDA Joint Agricultural Weather Facility)

GROUND-WATER CONDITIONS DURING SEPTEMBER 1992



New extremes occurred at 33 ground-water index stations (see table on page 26) during August — 28 lows (including 10 all-time, counting the equalling of an all-time low set in June) and 5 highs — compared with 28 new extremes last month. Graphs showing water levels in seven wells for the past 26 months are on page 27. Three of the graphs are for wells in the Alluvial Basins region; in Nevada (all-time low), in Utah (all-time low), and in Arizona (September high, but not listed in the extremes table as such because there are only three measurements of levels for September). The other graphs are for wells in the Nonglaciated Central region (Pennsylvania), Glaciated Central region (Indiana), Northeast and Superior Uplands region (New Hampshire), and Atlantic and Gulf Coastal Plain region (Arkansas).

Ground-water levels in the Western Mountain Ranges region were below last month's levels except in Washington, and below long-term average throughout the Region. An all-time low (the fourth in the last five months) occurred in the Cretaceous aquifer well near Helena, Montana.

In the Alluvial Basins region, ground-water levels were generally below last month's levels in Nevada, Utah, and New Mexico; above last month's in Oregon; and were mixed with respect to last month's levels in Arizona. Levels were below long-term averages except in the Oregon well, and one well each in Nevada, New Mexico, and Texas which were above average. All-time lows occurred in the valley–fill aquifer well near Las Vegas, Nevada (for the third consecutive month), and in the basin–fill aquifer well near Holladay, Utah (for the third consecutive month). September lows occurred in wells in California, New Mexico, and Utah.

In the Columbia Lava Plateau region, water levels were below last month's and below long-term averages throughout the Region. The level in the Snake River Plain aquifer well near Atomic City, Idaho, declined slightly from the June through August level (which was an all-time low) and set a new all-time low. September lows occurred in one well in Oregon and four wells in Idaho.

Ground-water levels in the Colorado Plateau and Wyoming Basin region were above last month's levels in Utah and below last month's levels in New Mexico. Levels were below long-term average in Utah and mixed with respect to average in New Mexico. A September low occurred in the Westwater Canyon aquifer well near Grants-Bluewater, New Mexico.

In the High Plains region, ground-water levels were below last month's levels in Nebraska, Oklahoma, and Texas, and about the same as last month's levels in New Mexico. Levels were below long-term averages except in Nebraska. An all-time low occurred in the Ogallala aquifer well near Lubbock, Texas (for the sixth consecutive month and the ninth time this year). A September low occurred in the Ogallala aquifer well near Colby, Kansas.

Ground-water levels in the Nonglaciated Central region were generally below last month's levels except in Oklahoma, where they were mixed with respect to last month's levels, and in Georgia, where they were below last month's levels. Water levels were generally above long-term averages in Oklahoma, Texas, Georgia, Kentucky, Maryland, West Virginia, and Pennsylvania, and below average elsewhere. All-time lows occurred in the Sentinel Butte aquifer well near Dickinson, North Dakota (for the 5th consecutive month and the

Provisional data; subject to revision

WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES–SEPTEMBER 1992

GROUND–WATER REGION Aquifer and Location	Aquifer type and local aquifer pumpage	Depth of well in feet	Water level in feet below land–surface datum	Departure from average in feet	Net change in water level in feet since: Last month	Last year	Year records began	Remarks
WESTERN MOUNTAIN RANGES (1)								
Rathdrum Prairie aquifer near Athol, northern Idaho	●	485	464.2	–5.3	–0.5	–6.8	1929	
ALLUVIAL BASINS (2)								
Alluvial valley-fill aquifer in Steptoe Valley, Nevada	□	122	9.56	...	–.11	...	1949	
Valley-fill aquifer, Elfrida area near Douglas, Arizona	◍	124	101.10	–15.98	.02	2.20	1947	
Hueco bolson aquifer at El Paso, Texas	●	640	272.37	–17.77	.31	.32	1964	
COLUMBIA LAVA PLATEAU (3)								
Snake River Plain aquifer near Eden, Idaho	●	208	124.6	–9.1	–1.8	–1.6	1962	Sept. low
Columbia River basalts aquifer, Pendleton, Oregon	◍	1,501	228.01	–34.30	–.66	–4.08	1965	Sept. low
COLORADO PLATEAU AND WYOMING BASIN (4)								
Dakota aquifer near Blanding, Utah	□	140	47.65	–2.41	.20	1.51	1960	
HIGH PLAINS (5)								
Ogallala aquifer near Colby, Kansas	◍	175	131.57	–11.04	–.21	–.24	1947	Sept. low
Southern High Plains aquifer, Lovington, New Mexico	◍	212	58.35	–3.55	.02	1.59	1971	
NONGLACIATED CENTRAL REGION (6)								
Sentinel Butte aquifer near Dickinson, North Dakota	○	160	22.40	–4.05	–.09	–.77	1968	All-time low
Sand and gravel Pleistocene aquifer near Valley Center, Kansas	●	54	19.57	–2.17	–.51	1.25	1937	
Glacial outwash sand and gravel aquifer near Louisville, Kentucky	◍	94	18.37	5.82	–.11	–1.35	1945	
Upper Pennsylvanian aquifer in the Central Appalachians Plateau near Glenville, West Virginia	○	25	13.29	3.84	–2.51	–.12	1953	
GLACIATED CENTRAL REGION (7)								
Fluvial sand and gravel aquifer, Platte River Valley, near Ashland, Nebraska	●	12	6.37	.07	–.41	1.88	1933	
Sheyenne Delta aquifer near Wyndmere, North Dakota	○	40	6.69	–.49	–.94	1.24	1963	
Pleistocene (glacial drift) aquifer at Princeton in northern Illinois	◍	29	6.00	...	.52	...	1942	
Shallow drift aquifer near Roscommon in north–central part of Lower Peninsula, Michigan	○	14	4.68	.37	.01	.17	1934	
Silurian–Devonian carbonate aquifer near Dola, Ohio	□	51	6.06	3.23	.37	5.25	1954	Sept. high
PIEDMONT AND BLUE RIDGE (8)								
Water–table aquifer in Petersburg Granite, southeastern Piedmont, Colonial Heights, Virginia	○	100	16.41	–.25	–.77	.85	1939	
Weathered granite aquifer, western Piedmont, Mocksville area, North Carolina	○	31	16.52	2.27	.14	–.16	1981	
Surficial aquifer at Griffin, Georgia	○	30	16.39	.74	.32	.43	1943	
NORTHEAST AND SUPERIOR UPLANDS (9)								
Pleistocene glacial outwash aquifer at Camp Ripley, near Little Falls, Minnesota	◍	59	...	...	...	...	1949	
Glacial outwash sand aquifer at Oxford, Maine	○	39	9.23	.18	–.33	–.45	1980	
Shallow sand aquifer (glacial deposits), Acton, Massachusetts	●	34	20.11	–.26	–.31	–.06	1965	
Stratified drift aquifer near Morristown, Vermont	○	50	20.67	–.79	–.57	–.41	1966	All-time low
ATLANTIC AND GULF COASTAL PLAIN (10)								
Columbia deposits aquifer near Camden, Delaware	○	11	7.97	–.66	–.12	.11	1950	
Memphis sand aquifer near Memphis, Tennessee	■	384	108.08	–16.08	.10	–.37	1940	Sept. low
Eutaw aquifer at Montgomery, Alabama	■	270	24.9	–.4	–.3	–.1	1952	
Evangeline aquifer at Houston, Texas	■	1,152	281.61	23.96	–.07	17.78	1978	
SOUTHEAST COASTAL PLAIN (11)								
Upper Floridan aquifer on Cockspur Island, Savannah area, Georgia	■	348	34.30	–5.41	–.25	–.40	1956	
Upper Floridan aquifer, Jacksonville, Florida	■	905	–22.4	–5.7	1.0	–1.4	1930	
Biscayne aquifer near Homestead, Florida	○	20	...	...	...	...	1932	

10th time this year), and the Equus aquifer well near Halstead, Kansas (for the third consecutive month). A September high occurred in the Twin Mountains (Trinity) aquifer well near Hurst/Fort Worth, Texas.

Ground-water levels in the Glaciated Central region were generally below last month's in the Dakotas, Kansas, and Illinois; mixed with respect to last month's levels in Indiana, Ohio, and New York; and generally above last month's levels elsewhere. Water levels were generally below long-term averages only in Illinois and Ohio. An all-time low occurred in the Lower Mount Simon aquifer well at Illinois Beach State Park, Illinois. A September low occurred in the Ironton-Galesville aquifer well at Illinois Beach State Park, Illinois, and a September high occurred in the Silurian-Devonian carbonate aquifer well near Dola, Ohio.

In the Piedmont and Blue Ridge region, ground-water levels were below last month's in Virginia; mixed with respect to last month's levels in North Carolina and Georgia; about the same or lower in Pennsylvania; and above last month's levels in Maryland. Levels were below long-term averages in Maryland; generally above long-term averages in Virginia; and mixed with respect to average in the remainder of the Region.

Provisional data; subject to revision

NEW EXTREMES DURING SEPTEMBER AT GROUND–WATER INDEX STATIONS

WRD Station Identification Number	GROUND–WATER REGION Aquifer and Location	Aquifer type and local aquifer pumpage	Depth of well	Years of record	End–of–month water level in feet below land surface datum: Previous September Record: Average	Extreme (year)	September 1992
	LOW WATER LEVELS						
	WESTERN MOUNTAIN RANGES (1)						
463906112043901	Cretaceous aquifer near Helena, Montana	□	110	16	30.15	36.25 (1991)	[1]39.25
	ALLUVIAL BASINS (2)						
382444121123301	Mehrten aquifer near Wilton, California	▩	300	6	136.51	140.62 (1991)	142.86
361611115151301	Valley–fill aquifer near Las Vegas, Nevada	■	905	47	37.90	104.43 (1991)	[1]116.19
324340104231701	Roswell Basin shallow aquifer at Dayton, New Mexico	●	250	41	93.50	123.11 (1991)	123.24
351051106395301	Basin–fill aquifer at Albuquerque, New Mexico	●	980	10	35.04	37.71 (1991)	38.64
403803111505301	Basin–fill aquifer near Holladay, Utah	■	165	14	74.27	91.33 (1991)	[1]99.33
414501111520001	Basin–fill aquifer near Logan, Utah	▩	43	52	–18.6	–10.8 (1990)	–10.8
	COLUMBIA LAVA PLATEAU (3)						
453934118491701	Columbia River basalts aquifer at Pendleton, Oregon	◍	1,501	26	191.13	223.93 (1991)	228.01
432700112470801	Snake River Plain aquifer near Atomic City, Idaho	◍	636	44	584.8	588.1 (1991)	[1]589.2
425635114382302	Snake River Plain aquifer at Gooding, Idaho	○	165	21	130.3	140.7 (1991)	148.5
433852116244801	Shallow alluvium aquifer near Meridian, Idaho	◍	32	51	5.2	8.5 (1988)	13.3
424053113412801	Snake River Plain aquifer near Rupert, Idaho	●	194	42	151.9	163.4 (1991)	166.0
423659114111601	Snake River Plain aquifer near Eden, Idaho	●	208	30	115.5	123.0 (1991)	124.6
	COLORADO PLATEAU AND WYOMING BASIN (4)						
352023107473201	Westwater Canyon aquifer near Grants-Bluewater, New Mexico	●	155	37	74.82	79.05 (1991)	80.25
	HIGH PLAINS (5)						
341010102240801	Ogallala aquifer near Lubbock, Texas	●	202	42	57.23	92.45 (1991)	[1]94.57
392329101040201	Ogallala aquifer near Colby, Kansas	◍	175	46	120.53	131.33 (1991)	131.57
	NONGLACIATED CENTRAL REGION (6)						
465755102410701	Sentinel Butte aquifer near Dickinson, North Dakota	○	160	24	18.35	21.63 (1991)	[1]22.40
375810097324301	Equus aquifer near Halstead, Kansas	◍	57	53	23.89	39.60 (1991)	[1]42.19
	GLACIATED CENTRAL REGION (7)						
422803087475302	Lower Mount Simon aquifer at Illinois Beach State Park, Illinois	■	2,264	4	202.52	202.68 (1990)	[1]210.33
422803087475304	Ironton-Galesville aquifer at Illinois Beach State Park, Illinois	■	1,203	4	233.49	233.41 (1990)	233.75
	NORTHEAST AND SUPERIOR UPLANDS (9)						
443405072323501	Stratified drift aquifer near Morristown, Vermont	○	50	26	19.88	20.47 (1988)	[1]20.67
	ATLANTIC AND GULF COASTAL PLAIN (10)						
341138091551601	Sparta aquifer near Pine Bluff, Arkansas	■	1,106	34	212.85	241.25 (1990)	241.35
331438092411901	Sparta aquifer near El Dorado, Arkansas	■	540	38	334.33	353.03 (1990)	359.31
321357092341701	Sparta aquifer near Ruston, Louisiana	▩	763	49	223.55	237.35 (1991)	[1]238.53
303108087162301	Sand and gravel aquifer at Ensley, Florida	□	239	53	73.84	81.65 (1982)	[1]84.33
372506076511703	Upper Potomac aquifer near Toana, Virginia	■	401	7	158.94	163.47 (1991)	[1]164.43
350900089482300	Memphis sand aquifer near Memphis, Tennessee	■	384	52	92.00	107.98 (1988)	108.08
	SOUTHEAST COASTAL PLAIN (11)						
281715082164401	Upper Floridan aquifer near San Antonio, Florida	□	150	29	37.38	44.75 (1990)	47.59
	HIGH WATER LEVELS						
	ALLUVIAL BASINS (2)						
452938122254801	Troutdale aquifer near Portland, Oregon	●	715	29	102.36	95.41 (1991)	90.72
	NONGLACIATED CENTRAL REGION (6)						
324842097102901	Twin Mountains (Trinity) aquifer near Hurst/Fort Worth, Texas	▩	667	14	463.46	446.80 (1991)	440.75
	GLACIATED CENTRAL REGION (7)						
404648083412600	Silurian-Devonian carbonate aquifer near Dola, Ohio	□	51	38	9.29	6.32 (1990)	6.06
	NORTHEAST AND SUPERIOR UPLANDS (9)						
445227067520101	Glacial sand and gravel aquifer at Hadley Lakes, Maine	○	30	7	5.84	...	5.16
	ATLANTIC AND GULF COASTAL PLAIN (10)						
322652083033001	Upper Floridan aquifer near Dexter, Georgia	□	123	28	34.15	30.75 (1976)	28.47

[1] All–time month–end low.

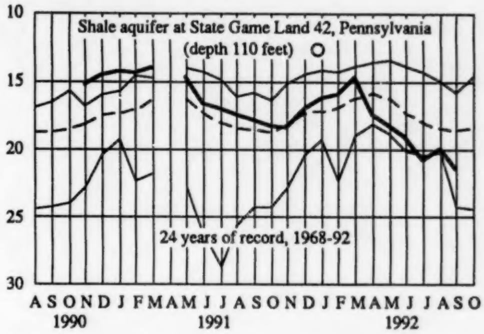
In the Northeast and Superior Uplands region, levels were generally above last month's levels in Maine and Vermont, and below last month's levels elsewhere. Water levels were above average in Maine, but were below average elsewhere. (There were no data reported for Minnesota.) An all-time high occurred in the Stratified drift aquifer well near Morristown, Vermont. A September high occurred in the Glacial sand and aquifer well at Hadley Lakes, Maine.

In the Atlantic and Gulf Coastal Plain region, water levels were above last month's in Tennessee, about the same in South Carolina, mixed in Arkansas, Louisiana, and Virginia, and generally below last month's levels elsewhere. Levels were above long-term averages in Texas and Kentucky, mixed in Georgia, and below average elsewhere. All-time lows occurred in wells in the Sparta aquifer near Ruston, Louisiana (for the 3rd consecutive month); sand and gravel aquifer at Ensley, Florida (for the 3rd consecutive month); and Upper Potomac aquifer near Toana, Virginia (for the 6th consecutive month and the 11th time this year). September lows occurred in wells in Arkansas and Tennessee. A September high occurred in the Upper Floridan aquifer well near Dexter, Georgia.

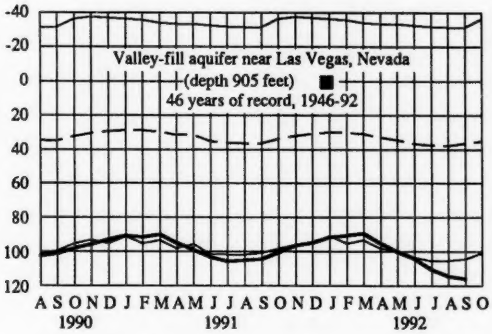
In the Southeast Coastal Plain region, water levels were generally above last month's in Florida, but below last month's in Georgia. Water levels were below long-term averages. A September low occurred in the Upper Floridan aquifer well near San Antonio, Florida.

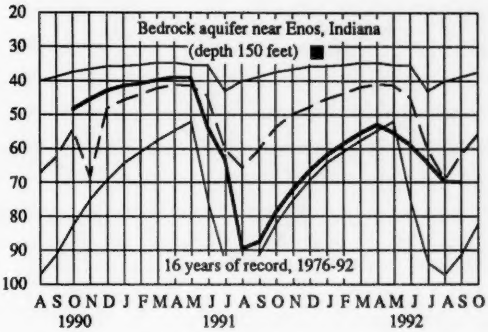
MONTHEND GROUND-WATER LEVELS IN SELECTED WELLS

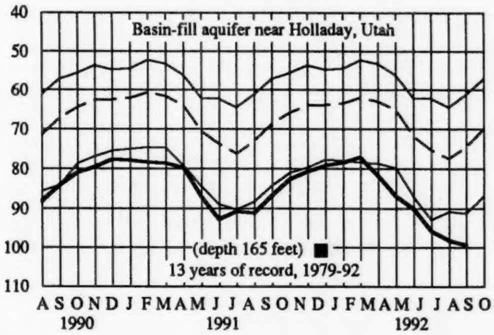
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.

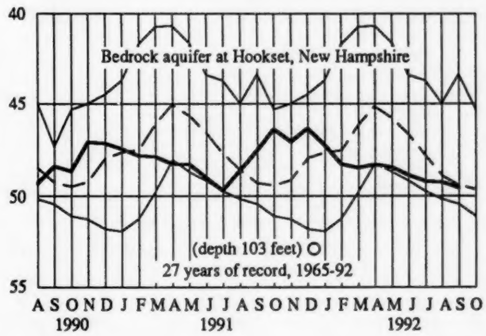


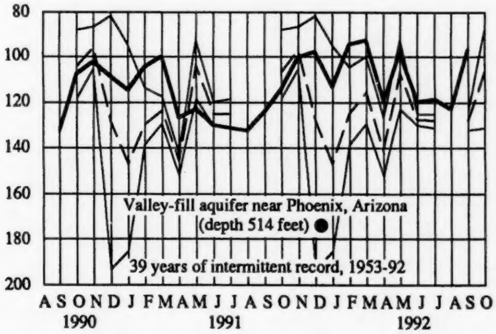
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM

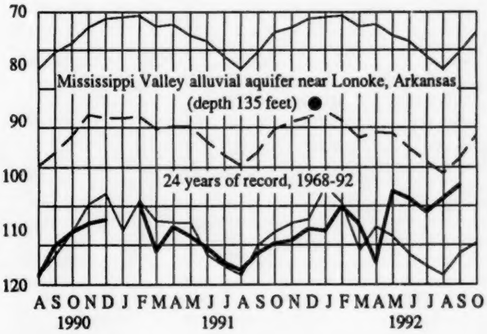




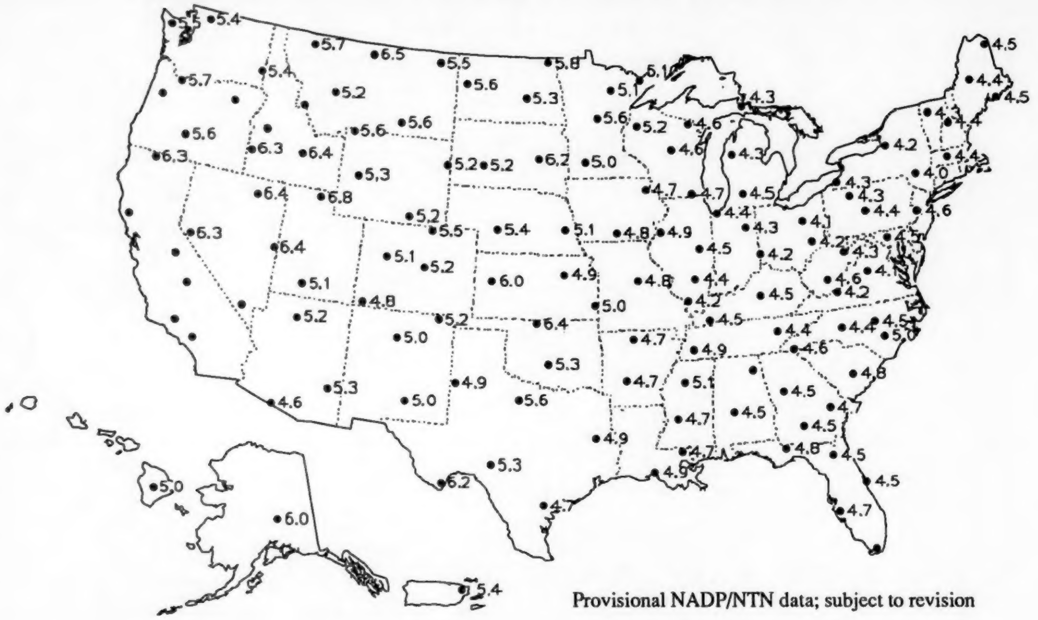








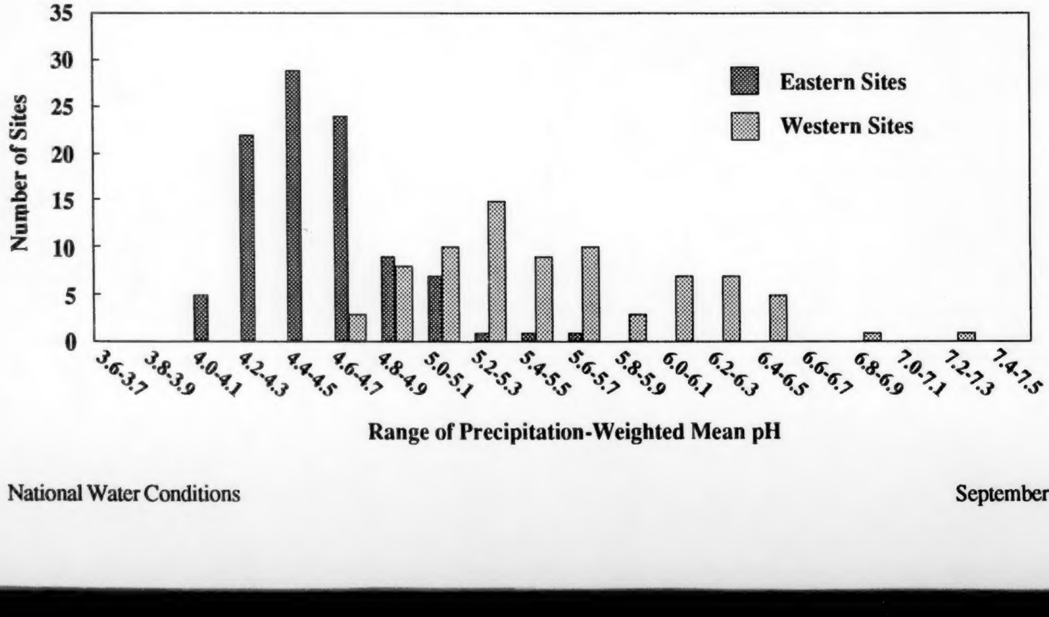
pH of Precipitation for August 24-September 20, 1992

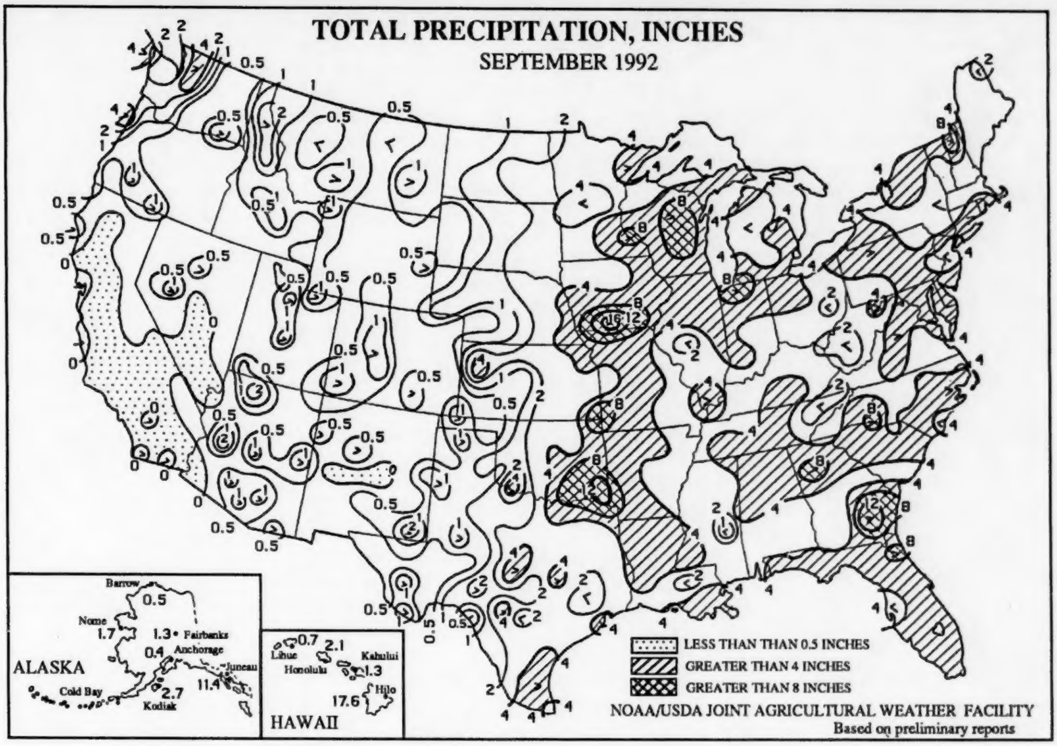


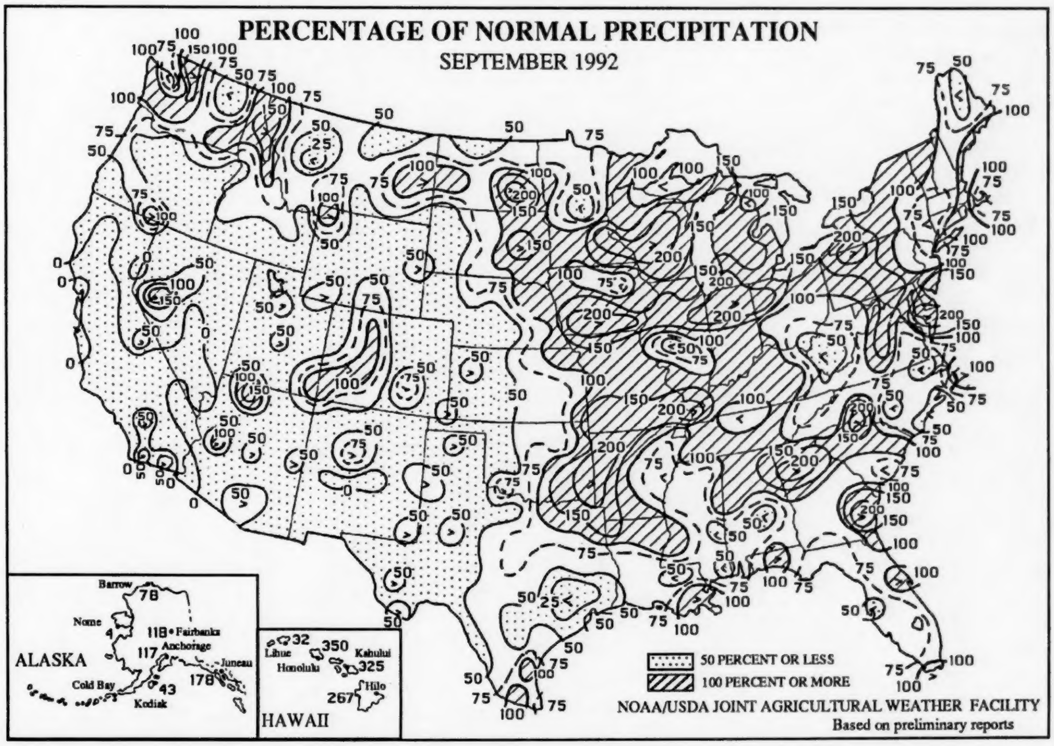
Current pH data shown on the map (• 4.9) are precipitation-weighted means calculated from preliminary laboratory results provided by the NADP/NTN Central Analytical Laboratory at the Illinois State Water Survey and are subject to change. The 128 points (•) shown on this map represent a subset of all sites chosen to provide relatively even geographic spacing. Absence of a pH value at a site indicates either that there was no precipitation or that data for the site did not meet preliminary screening criteria for this provisional report.

A list of the approximately 200 sites comprising the total Network and additional data for the sites are available from the NADP/NTN Coordination Office, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523.

Distribution of precipitation-weighted mean pH for all NADP/NTN sites having one or more weekly samples for August 24-September 20, 1992. The East/West dividing line is at the western borders of Minnesota, Iowa, Missouri, Arkansas, and Louisiana.





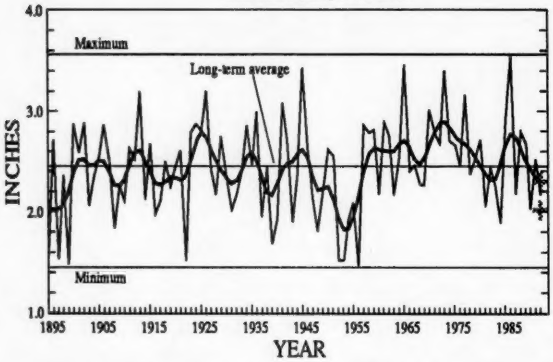


(From *Weekly Weather and Crop Bulletin*, NOAA/USDA Joint Agricultural Weather Facility)

UNITED STATES SEPTEMBER CLIMATE IN HISTORICAL PERSPECTIVE

Preliminary data for September 1992 indicate that temperature averaged across the contiguous United States was at the long term mean. September 1992 ranked as the 48th warmest (51st coolest) September on record. The 1992 value is based on preliminary data, which has been shown to be within 0.26 °F of the final data over a 4-month period. Only about 1 percent of the country averaged much cooler than normal while about 5 percent averaged much warmer than normal for September.

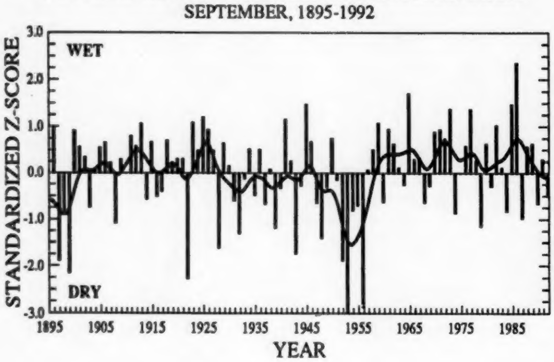
U.S. NATIONAL PRECIPITATION
SEPTEMBER, 1895-1992



Areally-averaged precipitation for the Nation (graph above) was slightly below the long-term mean, ranking September 1992 as the 27th driest (72nd wettest) September on record. The preliminary value for precipitation is estimated to be accurate to within 0.14 inch and the confidence interval is plotted in the graph above as a '+'. The heavier smooth curve is a nine-point binomial filter that averages out the year-to-year fluctuations and shows the longer-term variations. About 5 percent of the Country experienced much wetter than normal conditions and about 21 percent was much drier than normal.

Historical precipitation is shown in a different way in the graph below. The September precipitation for each climate division in the contiguous U.S. was first standardized using the gamma distribution over the 1951-80 period. These gamma-standardized values were then weighted by area and averaged to determine a national standardized precipitation value. These national weighted values were then normalized over their period of record. Negative values are dryer and positive values are wetter than the mean. This index gives a more accurate indication of how precipitation across the country compares to the local normal climate. The national standardized precipitation ranked 1992 as the 31st driest September on record.

U.S. NATIONAL WEIGHTED MEAN PRECIPITATION INDEX
SEPTEMBER, 1895-1992



The temperature and precipitation rankings for September 1992 for the nine climatically homogeneous regions show that the overall precipitation pattern consisted of wetter than average conditions in the Northeast (36th wettest), Central (29th wettest), and East North Central (19th wettest) regions and drier than normal for the western two-thirds of the country. The West region reported the eighth driest September on record and the Southwest had their fifth driest September since 1895. The month continued a trend, beginning in August, of an active upper level flow pattern. This allowed numerous frontal boundaries to parade across the country from the Pacific Northwest through the Mid-Atlantic region creating cooler than normal conditions for the Great Lakes region, Ohio valley, and Northeast. It was the 22nd coolest September on record for the Central region and the 24th coolest September for the East North Central region. The Northeast and Northwest regions ranked 36th and 38th coolest, respectively. The southern half of the country ranked in the mid and upper thirds of the historical distribution. It was the 23rd warmest September on record for the Southwest region and the 21st warmest such month for California and Nevada, collectively.

The September 1992 temperature rankings for the 48 contiguous States show that Arizona reported the sixth warmest September on record and only five other States (CA, CO, NV, UT, WY) ranked in the warm third of the historical distribution. No States were in the top ten coolest. However, 15 States located mostly in the eastern plains and northeast, were in the cool third of the historical distribution for the month.

For the year thus far, the Nation as a whole continued unusually warm, with January through September 1992 ranking as the 14th warmest such period on record. January-September 1992 ranks the seventh consecutive such year-to-date period of above to much above normal temperatures. About a fifth (20.5 percent) of the country had January-September average temperatures much warmer than normal while 7.4 percent averaged much cooler than normal.

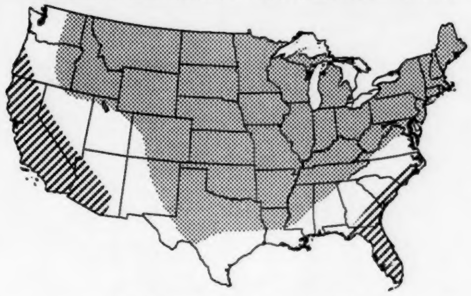
Year-to-date temperature rankings for the 48 contiguous States show that eight States ranked in the top ten warmest category, with Washington having the warmest January-September on record, while California, Idaho, Nevada, and Oregon each reported their second warmest January through September period. It was the third warmest September in 98 years for Wyoming and fourth warmest for Montana. Although none of the States ranked in the top ten coolest category for year to date, 15 States had rankings in the cool third of the historical distribution.

Precipitation averaged across the contiguous U.S., for the year thus far, ranks 1992 in the middle of the historical distribution at 37th wettest (62nd driest). When the local normal climate is taken into account however, the year to date ranks as the 45th wettest such period on record. About an eighth (12.0 percent) of the Nation averaged much wetter than normal while 8.4 percent averaged much drier than normal. January-September precipitation rankings for the 48 contiguous States give an indication of the year-to-date regional pattern. Four States (ID, IL, NH, and OR) had rankings in the top ten driest category. Two States (AZ and TX) ranked in the top ten wettest. A total of thirteen States were in the driest third of the historical distribution while twelve States were in the wettest third.

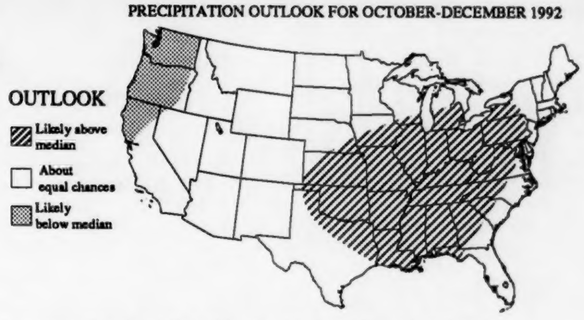
There was little change in national long-term drought conditions from August to September. The percent area of the contiguous U.S. experiencing severe to extreme long-term drought (as defined by the Palmer Drought Index) continued at about 13.5 percent while the percent area experiencing long-term wet conditions decreased to about 20 percent of the country. The core drought areas appear to be focused in the Pacific Northwest and Great Basin, while the core wet areas stretched from the Lower Colorado Basin to the Great Plains Basin.

(From *Climate Variations Bulletin*, National Climatic Data Center, NOAA)

TEMPERATURE OUTLOOK FOR OCTOBER-DECEMBER 1992



PRECIPITATION OUTLOOK FOR OCTOBER-DECEMBER 1992



From *Monthly and Seasonal Weather Outlook* prepared and published by the National Weather Service

NATIONAL WATER CONDITIONS

SEPTEMBER 1992

Based on reports from the Canadian and U.S. Field offices; completed February 1, 1992

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EXPLANATION OF DATA (Revised December 1990)

Cover map shows generalized pattern of streamflow for the month based on provisional data from 186 index gaging stations—18 in Canada, 166 in the United States, and 2 in the Commonwealth of Puerto Rico. Alaska, Hawaii, and Puerto Rico inset maps show streamflow only at the index gaging stations that are located near the point shown by the arrows. Classifications on map are based on comparison of streamflow for the current month at each index station with the flow for the same month in the 30-year reference period, 1951-80. Shorter reference periods are used for one Canadian index station, two Kansas index stations, and the Puerto Rico index stations because of the limited records available.

The ***streamflow ranges map*** shows where streamflow has persisted in the above- or below-normal range from last month to this month and also where streamflow is in the above- or below-normal range this month after being in a different range last month. Three ***pie charts*** show: the percent of stations reporting discharges in each flow range for both the conterminous United States and southern Canada, and also the percent of area in each flow range for the conterminous United States and southern Canada. The ***combination bar/line graph*** shows the percent departure of the total mean from the total median flow (1951-80) and the cumulative departure from median (in cfs) for all reporting stations (excluding eight large river stations indicated by # in the ***Flow of large rivers*** table) in the conterminous United States and southern Canada.

The comparative data are obtained by ranking the 30 flows for each month of the reference period in order of decreasing magnitude—the highest flow is given a ranking of 1 and the lowest flow is given a ranking of 30. Quartiles (25-percent points) are computed by averaging the 7th and 8th highest flows (upper quartile), 15th and 16th highest flows (middle quartile and median), and the 23rd and 24th highest flows (lower quartile). The upper and lower quartiles set off the highest and lowest 25 percent of flows, respectively, for the reference period. The median (middle quartile) is the middle value by definition. For the reference period, 50 percent of the flows are greater than the median, 50 percent are less than the median, 50 percent are between the upper and lower quartiles (in the normal range), 25 percent are greater than the upper quartile (above normal), and 25 percent are less than the lower quartile (below normal). Flow for the current month is then classified as: in the ***above-normal range*** if it is greater than the upper quartile, in the ***normal range*** if it is between the upper and lower quartiles, and in the ***below-normal range*** if it is less than the lower quartile. Change in flow from the previous month to the current month is classified as ***seasonal*** if the change is in the same direction as the change in the median. If the change is in the opposite direction of the change in the median, the change is classified as ***contraseasonal*** (opposite to the seasonal change). For example: at a particular index station, the January median is greater than the December median; if flow for the current January increased from December (the previous month), the increase is seasonal; if flow for the current January decreased from December, the decrease is contraseasonal.

Flood frequency analyses define the relation of flood peak magnitude to probability of occurrence or recurrence interval. ***Probability of occurrence*** is the chance that a given flood magnitude will be exceeded in any one year. ***Recurrence interval*** is the reciprocal of probability of occurrence and is the average number of years between occurrences. For example, a flood having a probability of occurrence of 0.01 (1 percent) has a recurrence interval of 100 years. ***Recurrence intervals imply no regularity of occurrence***; a 100-year flood might be exceeded in consecutive years or it might not be exceeded in a 100-year period.

Statements about ***ground-water levels*** refer to conditions near the end of the month. The water level in each observation well is compared with average level for the end of the month determined from the entire period of record for that well. ***Changes in ground-water levels***, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data are given for five stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). ***Dissolved solids*** are minerals dissolved in water and usually consist predominately of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. ***Dissolved-solids discharge*** represents the total daily amount of dissolved minerals carried by the stream. ***Dissolved-solids concentrations*** are generally higher during periods of low streamflow, but the highest dissolved-solids discharges occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

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